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PROCEDURES FOR

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INSTRUCTIONAL SYSTEMS DEVELOPMENT

NAVEDTRA 110A

1

DEPARTMENT OF THE NAVY
CHIEF OF NAVAL EDUCATION AND TRAINING
NAVAL AIR STATION
PENSACOLA, FLORIDA 32508

Code N-911
18 Sep 1981

LETTER OF PROMULGATION

1. This manual provides guidance for the analysis, design, development, implementation, and control of instructional programs under the direct cognizance of CNET.

2. All curricula developed within or for use within the NAVEDTRACOM, except submarine training materials specified in CNETINST 1550.14, will be developed in accordance with the policy, procedures, and standards contained herein.

3. Corrections or comments concerning this publication are invited and should be addressed to CNET (Code N-9).

4. This publication is available from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

5. *Reviewed and approved this date in accordance with* SECNAVINST 5200.16A.

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Additionally, appreciation is extended to every user of NAVEDTRA 110 who provided comments, recommendations, or suggestions for this revision (1978 to January 1981). Your support played a major role in the types of changes included in this revision as well as the overall format and content. Your participation is not only appreciated, it is essential to the on-going appraisal of this document. You are encouraged to continue to help evaluate the usefulness of these procedures by forwarding your comments/recommendations to CNET (Code N-911). A tear-out form letter is provided in the back of this manual for your convenience.

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FOREWORD

This manual was designed to be used by personnel who are tasked to design and develop instructional material.

The people who prepared this manual have experienced the same problems and frustrations that you will face. Every attempt has been made to make the "materials" practical and usable.

Don't ever lose sight of your ultimate goal--to make learning in the Navy's schools and courses as job-relevant as possible.

Forms Availability: The forms required by this publication may be obtained by submitting DD Form 1348 to the Commanding Officer, Naval Air Station (Code 19623), Pensacola, Florida 32508, citing the below listed stock numbers:

CNET-GEN 1540/4	S/N 0197-LL-NFO-3721
CNET-GEN 1540/5	S/N 0197-LL-NFO-3731
CNET-GEN 1540/6	S/N 0197-LL-NFO-3741
CNET-GEN 1540/8	S/N 0197-LL-NFO 3761
CNET-GEN 1550/4	S/N 0197 LL-NFO 4731

PHASE I

ANALYZE

1.0 INTRODUCTION

Analyzing the job is the beginning of the Instructional Systems Development (ISD) process. Because job analysis establishes what will be taught, it is the single, most important step in the ISD process. The Naval Establishment, ashore and afloat, is comprised of various ratings. Persons in each rating must perform specific jobs. Each job, in turn, requires specific duties, tasks, and elements. Job analysis will always be the first step in developing a new course or revising (Type A or B) an existing one. (See section 1.1.2. for an explanation of Type A and B revisions). Job analysis is the basic method used to obtain a detailed listing of duties, tasks, and elements necessary to perform a clearly defined, specific job or duty. Analyzing a job may involve any or all of the techniques of job interviews, questionnaire surveys, a jury of experts, and group interviews. For new equipment or systems where job incumbents cannot be questioned, engineering data and specifications must provide the basis for the job analysis.

Required Documentation: Project Plan, Job Task Inventory (JTI).

1.1. ANALYZE REQUIREMENT

Training requirements may originate from a number of sources: new systems acquisition, equipment and weapons systems modification programs, technical audits of training courses, feedback from internal and external training appraisal, etc. However, while training requirements may arise from any and all of the above sources, instructional systems development

will generally fall into one of two categories, new courses and course revisions.

1.1.1 New Courses.

Even if the only job information available is someone's general idea of what the new job will be like, it still may be necessary to have a training course ready in time to begin training before a new system or equipment is put into operation. Very few things in the world, however, are completely new. Most likely you will find the new job to be a regrouping of a variety of tasks that are presently being performed in similar or other closely related jobs, with some new tasks added. Therefore, if you can identify, at least tentatively, the tasks that are already performed in similar jobs, you can analyze that part of the new job by collecting and analyzing job data from existing courses.

For new tasks not presently performed in any existing job, however, you may have to make some assumptions that will later prove to be wrong. But if these tasks are completely new and a clearly related or similar job is not presently performed anywhere by anyone, your data will not be totally valid in any case until analysis is done on the job after the operation begins.

1.1.1.1 Review Existing Courses. Obviously, considerable time and resources can be saved if there are existing courses which will meet some or all of your training requirements. Therefore, before proceeding in the development of a new course, you must first verify that no other courses already exist which could satisfy your training requirements.

Listed below are documents which contain a standard listing of all courses of instruction offered by each service. This listing may be used as a guide to ascertain availability of courses which could provide some or all of the instruction necessary to meet your training requirements.

. NAVY --------- NAVEDTRA 10500 (series),

Catalog of Navy Training Courses

- MARINE CORPS -- Marine Corps Order P1500.12, Formal Schools Catalog

- AIR FORCE ----- Air Force Manual 50-5, USAF Formal Schools Catalog

- ARMY ---------- Department of Army Pamphlet 351-4, Formal Schools Catalog

The above course listings may be obtained by writing to the following agencies:

U.S. NAVY -------- Chief of Naval Education and Training
Naval Air Station
Pensacola, FL 32508

U.S. MARINE CORPS - Commandant of the Marine Corps
Code HQSP
HQ U. S. Marine Corps
Washington, DC 20380

U.S. AIR FORCE --- Director of Programs Management (TTP)
DCS/Technical Training
HQ Air Training Command
Randolph AFB, TX 78148

U.S. ARMY --------- Deputy Chief of Staff for Training and Schools
U. S. Army Training and Doctrine Command
Fort Monroe, VA 23651

If after reviewing all courses which appear to be relevant to your training requirements, one or more acceptable courses are identified, then all or part of the ISD analysis phase can be avoided (see Figure I-1).

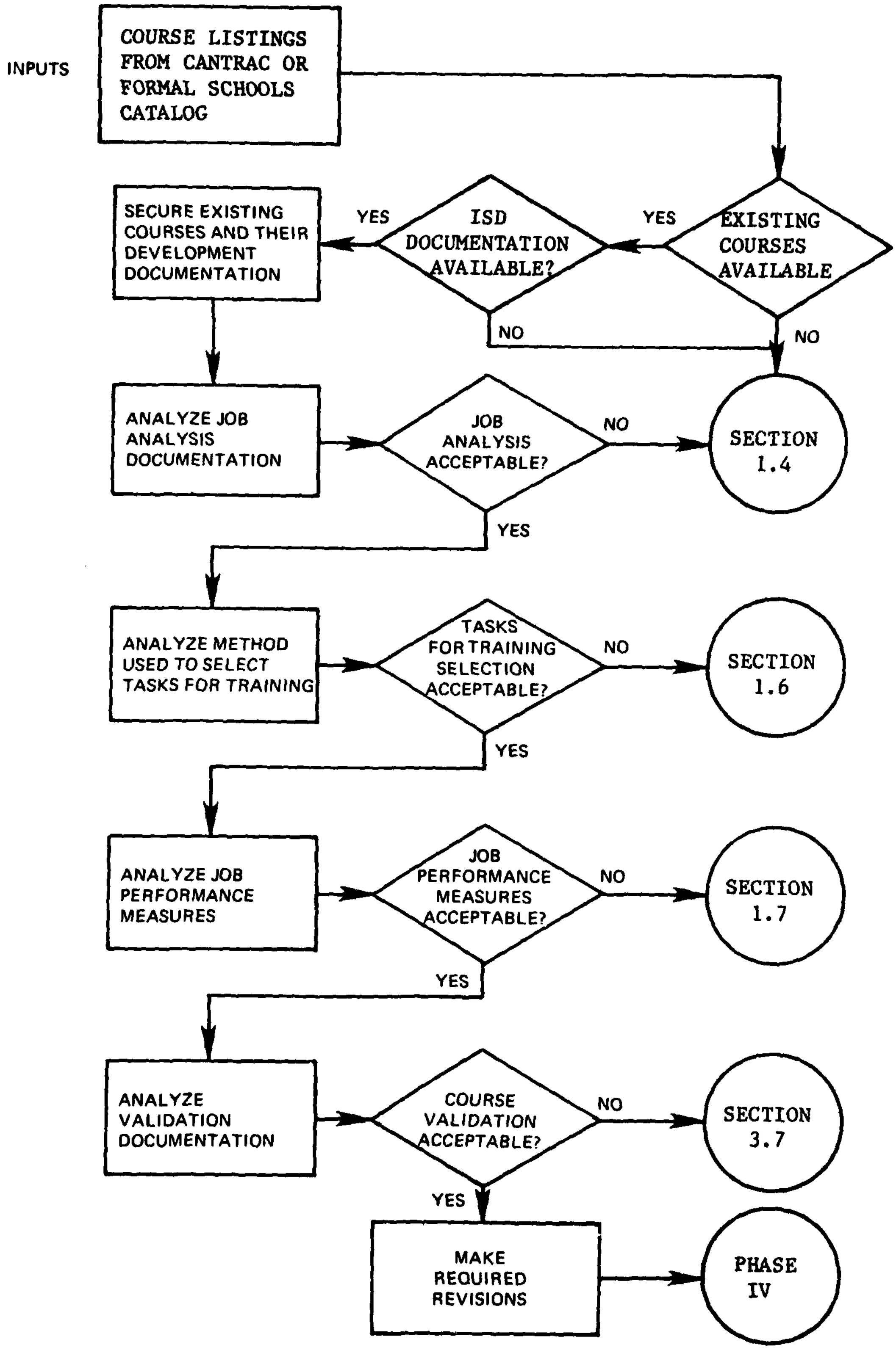

INPUTS
COURSE LISTINGS FROM CANTRAC OR FORMAL SCHOOLS CATALOG
EXISTING COURSES AVAILABLE
YES
ISD DOCUMENTATION AVAILABLE?
YES
SECURE EXISTING COURSES AND THEIR DEVELOPMENT DOCUMENTATION
NO
NO
ANALYZE JOB ANALYSIS DOCUMENTATION
JOB ANALYSIS ACCEPTABLE?
NO
SECTION 1.4
YES
ANALYZE METHOD USED TO SELECT TASKS FOR TRAINING
TASKS FOR TRAINING SELECTION ACCEPTABLE?
NO
SECTION 1.6
YES
ANALYZE JOB PERFORMANCE MEASURES
JOB PERFORMANCE MEASURES ACCEPTABLE?
NO
SECTION 1.7
YES
ANALYZE VALIDATION DOCUMENTATION
COURSE VALIDATION ACCEPTABLE?
NO
SECTION 3.7
YES
MAKE REQUIRED REVISIONS
PHASE IV

Figure I-1

1.1.2 Course Revisions.

Most curriculum development efforts will involve revising and improving existing courses. There are three basic types of course revisions:

. TYPE A REVISIONS. Type A revisions: involve changes in course length, objectives, and subject matter to such an extent that logistics support, personnel allocations, funds, and the like are affected.

. TYPE B REVISIONS. Type B revisions involve modifications within the established structure of the course. They include major rescheduling of topics, reallocations of time, revisions of instructional procedures, and similar actions.

. TYPE C REVISIONS. Type C revisions involve minor changes such as the following: correction of clerical errors, insertion of titles or designations of films, publications, and equipment, minor adjustments in time allocations, and addition of learning activities.

Both Type A and Type B course revisions require approval by higher authority and must be conducted in accordance with an approved Project Plan (See section 1.2.1). Type C revisions, on the other hand, may be made at the discretion of the Course Curriculum Model Manager and do not require a Project Plan.

1.1.2.1. <u>Review Evaluation Data.</u> To pinpoint problem areas in an existing course, three factors must be considered:

(a) First, it must be determined whether or not a training problem really exists. For example, if personnel are being trained to operate or maintain an electrical gyro and are then being assigned to ships with mechanical gyros, there is a management problem, not a training problem.

(b) Next, the job task analysis data on which the course is based must be analyzed to ensure that the tasks being trained are the tasks that should be trained. Before a course is revised, evidence must be obtained from internal and external evaluation that the existing course

does not adequately train personnel to perform on the job. The guidelines for conducting internal and external evaluation are provided in Section V of this manual and in CNETINST 1540.3 series and CNETINST 1540.6 series.

(c) Finally, the training materials must be evaluated. A course should not be revised unless internal and external evaluation data indicate a serious problem with the existing course materials.

1.2 PLANNING

When and where planning begins depends upon the tasking and scope of the project. For new systems acquisition and major equipment or weapons system modification programs, for example, instructional systems development will usually be included in the planning, budgeting, and programming actions of a formal Navy Training Plan (NTP) as specified in OPNAVINST 1500.8J. In other instances, documentation must be prepared to either apprise higher authority of the need for course development/revision or to submit a plan of action and milestones for approval in response to a tasking assignment.

1.2.1 Project Plan

The Project Plan is a planning document for the management, administration, and control of NAVEDTRACOM instructional program development projects which are either not included in the planning, budgeting, and programming actions of a formal NTP; or for which a formal NTP is not warranted. With the exception of deviations authorized by CNET Directive for Instructional Program Development Centers, the Project Plan serves as the primary management tool for initial assessment, tracking, and accountability for the development of a new course or the revision of existing courses of instruction. The Project Plan must be prepared in accordance with the format provided in Figure I-2 and submitted to higher authority for approval prior to the initiation of any changes modifications, or development activity.

PROJECT PLAN

for

Deep Sea (HeO_2) Diving Officer Course

A-4N-0010

Prepared by

Naval Diving and Salvage Training Center
Panama City, FL 32407

Chief of Naval Education and Training
Naval Air Station
Pensacola, FL 32508

25 MARCH 1981

Figure I-2.--Sample Project Plan (Page 1 of 4).

1. Course Identification Number and Title:
A-4N-0010, Deep Sea (HeO_2) Diving Officer Course

2. Course Mission Statement: To provide personnel with no prior diving experience the training necessary to perform mixed-gas diving and salvage operations and the associated administrative details. Operations may be performed from surface vessels or shore based facities, as necessary, dependent upon organizational mission and commander's requirements.

3. Objective of Project: To decrement advanced MK V Deep Sea Diving System training in order to provide more effective and up-to-date training which will produce personnel capable of performing with greater competency on the job. Specific corrections to the course:

a. Deletions:

(1) Lesson Topic 6.1 - MK V Deep Sea Diving System
(2) Lesson Topic 6.2 - MK V Surface Supported Diving System Diving
(3) Lesson Topic 6.3 - MK V Surface Supported Diving System Tender

b. Additions:

(1) More MK 12 Surface Supported Diving System training in open water.
(2) More MK 1 Lightweight Diving System training in open water.
(3) More Underwater Hydraulic Tools training in open water.

Figure I-2.--Sample Project Plan (Page 2 of 4).

4. Reasons for Course Revision:

a. Since the introduction of the MK 1 Lightweight Diving System (formerly KMB-9) into the fleet providing a faster, more efficient deep dive capability than the previously used MK V Deep Sea Diving System (DSDS), use of the MK V DSDS for operational tasks has steadily declined. This trend was most apparent during a Navy Occupational Task Analysis Program (NOTAP) survey of the diving community in 1977. With the exception of training commands and indoctrination dives, virtually no one was using the MK V DSDS. The further demise of the dated MK V DSDS was brought about with the introduction, in 1979-80, of the MK 12 Surface Supported Diving System (SSDS) to the fleet. This lighter, simpler, more modern gear has the specific mission of replacing the MK V DSDS and the accompanying Navy Training Plan directs the complete phase out of MK V DSDS training in fiscal year 1984.

With the increased use of MK 1 Lightweight Diving System and MK 12 SSDS by fleet personnel, and the dramatic decline on the use of the MK V DSDS over several years, it stands to reason that diver training should reflect this trend in order to remain abreast of the needs of the fleet.

5. Impact if Revision is not Undertaken: If the course is not revised, students will continue to receive advanced training in equipment no longer used in fleet diving operations and receive only limited exposure to equipment used daily in the fleet. This will continue until FY 84 at which time MK V training will be ceased.

Figure I-2.--Sample Project Plan (Page 3 of 4).

6. Schedule of Significant Events (POA&M):

Phase	Proposed Start Date	Estimated Completion Date
a. Analysis	13 April 1981	17 April 1981
b. Design	20 April 1981	24 April 1981
c. Development	27 April 1981	15 May 1981
d. Implementation	1 June 1981	
e. Control	1 July 1981	

7. Resource Requirements:

a. For Course Revision: The course revision will be an in-house production that will not require additional resources.

b. Summary of anticipated changes in resource requirements (FY 81)

(1) Personnel: None
(2) Material: None
(3) Time: Training time for the MK V DSDS will be decreased by one week; however, the time saved by deleting this portion of the course will be balanced by the addition of MK 1 Lightweight Diving System, MK 12 SSDS and Underwater Hydraulic Tools training.

FIGURE I-2.--Sample Project Plan (Page 4 of 4).

1.2.1.1 Elements of the Project Plan. The basic elements of the Project Plan consist of the Cover, Course Information, Objectives of the Project, Reasons for Course Revisions, Impact if Revision is not Undertaken, Schedule of Significant Events, and Resource Requirements.

. COVER. The following items will be included on the cover (Figure I-1, page 1):

1. The complete title, with no abbreviations, of the document and the course for which the project plan is being prepared.

2. The course identification number.

3. The name and address of the agency preparing the project plan.

4. The name and address of the curriculum approval authority to who the Project Plan will be submitted.

5. The date of preparation of the project plan.

6. Appropriate classification markings.

. TEXT. The text contains at a minimum the following items (Figures I-1, pages 2 through 4):

1. Course Identification Number and Title.

2. Course Mission Statement from current course.

3. Objectives of Project. A statement of the proposed changes to the course, identifying all recommended deletions and additions.

In addition to the above items, course description data (i.e., course length, average-on-board (AOB), Instructor/Staff manning and mode(s) of instruction) may be included and should be if any of these items will be significantly affected by the proposed changes.

4. Reasons for Course Revisions. This section should describe the reasons for the proposed course revision and anticipated benefits. The latest results of Annual Course Reviews, external feedback resulting from the Training Appraisal program, or any other sources which have identified a need for a revision should be identified. Specific references should be cited.

5. Impact if Revision is Not Undertaken. A statement should be clearly made in terms of the impact on fleet requirements and capabilities if the revision is not made.

6. Schedule of Significant Events. This section will contain a POA&M identifying a proposed start date and estimated completion date for each phase of the revision identified in terms of the ISD phases in this manual.

7. Resource Requirements. Resources, both personnel and materials, required to revise the course will be listed. Cost estimates will be provided for all equipment required and any lead time problems will be highlighted.

1.3 ANALYZE EXISTING COURSES

Where a particular ISD program begins depends upon the magnitude and scope of your training requirement. If, for example, your tasking is to develop a new course and your analysis of the requirement has indicated that no existing course appears to be capable of accomplishing the necessary training, it may be necessary to begin with an analysis of the job which the new course will be designed to train. It must be reiterated, however, that very few things in this world are completely new; and if even a part of the existing course is applicable to the required training, it should be carefully considered before proceeding through the entire ISD process.

At this point, it really doesn't matter whether you are analyzing an existing course to pinpoint a problem indicated by internal and/or external evaluation data, or attempting to verify

the capability of an existing course to accomplish training identified for a new program. The procedures are the same.

1.3.1 Secure Existing Course Documentation.

The first step in determining if an existing course will meet the training needs is to verify the acceptability of the job analysis upon which the course was based and the acceptability of the validation documentation.

The following sources of existing courses and course development documentation will provide such documentation, if available.

- NAVY -------- Naval Education and Training Program Development Center
  (Code IPD-1)
  Pensacola, FL 32509
  AUTOVON: 922-1646

- MARINE CORPS -- USMC Manpower Utilization Office
  MCCED Code MPU
  Quantico, VA 22134
  AUTOVON: 278-2890

- AIR FORCE --- USAF Occupational Measurement Center (OMY)
  Lackland AFB,
  San Antonio, TX 78236
  AUTOVON: 927-3664

- ARMY -------- U. S. Army Training and Doctrine Command
  Director, Training Management Institute
  ATTN: 6-TMI
  Fort Eustis, VA 23604
  AUTOVON: 927-3366

1.3.2 Analyze Existing Job Analysis Data

If an existing course was developed by ISD and course development documentation is available,

valuable time and resources can be saved by following the steps outlined in Figure I-1. If ISD was not used or if development documentation is unavailable, go to section 1.4. If existing course documentation indicates that job analysis was done in accordance with the procedures prescribed in section 1.4, you can have considerable confidence in the accuracy of the job analysis.

1.3.3 Analyze Method used to Select Tasks for Training

If your analysis of existing course documentation indicated an acceptable job analysis, chances are that the methodology for selecting tasks for training will also be found to be appropriate. The criteria for selecting tasks for training which will be discussed in section 1.6 will assist you in judging the acceptability of the tasks selected for training. However, unless you have an ideal situation where an existing course can be used to meet a requirement for a new course with only minor changes, you will probably need to add new tasks and/or delete existing ones. But it will still be more practical and considerably less expensive to develop training for the added tasks and integrate this new training into an existing course than to go through the entire ISD process of producing new documentation.

1.3.4 Analyze Job Performance Measures (JPM's)

Since the development of JPM's is a costly process which requires expertise and resources not available in most schools, existing courses may not have JPM's. If JPM's are available in existing course documentation and the seriousness of inadequate performance demands the application of JPM's, the detailed guidance contained in NAVEDTRA 106A on how to develop good JPM's will assist you in recognizing good JPM's developed by others. No existing training program, however, should be rejected solely for the lack of JPM's.

1.3.5 Analyze Validation Documentation

If documentation of course validation data is available and it appears that the existing course has been properly validated, you will need to know something of the sample population of students used to validate the course. Unless there is reasonable certainty that the sample used to validate the existing course is representative of the student population for which your training program is intended, you will have to revalidate the course for your students.

1.3.6 Make Required Revisions

If you have determined that an existing course is suitable for accomplishing your training requirements, and analysis of the existing course documentation verifies that only minor changes are required, you will still need to personalize the instructional management plan to fit the constraints of an existing training facility, or a learning environment slightly different than that in which the existing course has been used. Any such changes, however, will be a relatively minor effort compared to the considerable savings resulting from your use of an acceptable existing course.

If a suitable course was not found, any portions of the analyzed courses that are potentially useful in designing a new course should be retained for consideration in the development of a new course or the necessary revision to existing training (see section 3.3 of Phase III).

1.4 ANALYZE JOB

All courses or programs of instruction must be based on a sound appraisal of the job. After it has been established that no existing course is capable of adequately training an individual to do a particular job, the first step in ISD is to define exactly what constitutes or will constitute

adequate on-the-job performance. At this point, you will have already determined how much, if any, of the job analysis work has been done. But regardless of your familiarity with the job, there are no short-cuts. You must review all available job information including both official and unofficial documents.

1.4.1 Review Available Job Information

Within the Navy, information for existing jobs may be obtained from several sources. Those discussed in the following paragraphs represent a sampling of those available.

1.4.1.1 Naval Occupational Task Analysis Program (NOTAP). NOTAP conducts job task analyses on enlisted ratings and officer training for the Navy Occupational Development and Analysis Center (NODAC) of the Naval Military Personnel Command. NOTAP printouts, if available, should be used in developing JTI's. For purpose of illustrating how NOTAP printouts can be used in job analysis, the Job Description (JOBDEC) printout is discussed.

JOBDEC describes people within a given rating by any number of specific criteria. For example, JOBDEC is a job description of people who perform in any one of the many occupational areas that make up the rating and spend a similar amount of time on the same tasks. JOBDEC by paygrade is a job description of members of each paygrade, showing the percent of that paygrade and the percent of time spent by that paygrade doing each duty or task. JOBDEC by any variable is a job description of members responding to any one or more items, other than task statements, contained in the inventory. Examples are a JOBDEC of all members of a rating who respond to the operation or repair of a particular piece of equipment, work on a particular type of aircraft, have a particular title identifying their job, or have (a) certain NEC('s).

The JOBDEC's discussed above are but a few of those available. JOBDEC can be used to describe billets and members performing in areas directly

related to almost any phase of a training program.

The JOBDEC may be ordered in:

. descending order of percent of members performing

. descending order of percent of time spent performing

. descending order of average percent of time spent by all members, and

. alphabetical order according to task statement codes.

1.4.1.2 Occupational Standards. The Navy Occupational Development and Analysis Center (NODAC) writes occupational standards for enlisted ratings as determined by personnel management. These standards present occupational criteria for personnel training, advancement, and distribution.

1.4.1.3 Technical Documents. Technical manuals and other technical publications give valuable job performance information on the operation and maintenance of equipment, weapons, and weapons systems. These should be used as sources in developing the JTI.

1.4.1.4 Personnel Qualification Standards (PQS). The Navy PQS program is a method for qualifying officers and enlisted personnel in performing their duties. The knowledge and skills required to qualify for a specific watch station, to maintain specific equipment or systems, or to perform as a team member have been developed based on task analyses.

1.4.1.5 Ships' Maintenance and Material Management (3-M) Systems. The 3-M Systems consist of two systems: The Planned Maintenance System (PMS) and the Maintenance Data System (MDS). Data obtained from these sources are hardware-oriented and provide information on what is necessary to perform the job (i.e., steps of procedure to follow, tools required, safety precautions, time required to perform. The 3-M

systems should be used to list preventive maintenance tasks.

1.4.1.6 Research Reports. Information on different occupations and jobs has been collected by the Department of Defense in the form of surveys, research reports, and special studies. A review of any applicable research is recommended.

1.4.1.7 Other Relevant Sources. Ship Manning Documents and NAVMAT ships' visitation reports should be reviewed for information not provided by other sources.

1.4.2 Develop a Data Collection Plan

A data collection plan must be developed based upon resources available. The information required to select tasks for training (Section 1.6) should be gathered as part of the data on job incumbents' performance. The data collection methods listed in the following paragraphs can be used to develop and refine the plan and to compile and verify the list of tasks. It is unlikely that any one of the printed job information sources listed in paragraph 1.4.1 would provide the range of information needed, nor would the source always identify tasks actually performed by job incumbents. For example, technical manuals provide more information than is actually used on the job. If the incumbents do not perform depot level maintenance tasks, it would be inaccurate and misleading to list them in the JTI simply because they were covered in a technical manual. Most job analysis data collection plans use one or more of the following methods in addition to the printed sources.

1.4.2.1 Onsite Observation/Job Interviews. This method involves sending job analysts to observe and interview incumbents and their supervisors on the job. Data are collected on the range of duties and tasks performed, frequency and duration of performance, conditions under which tasks are performed, tools and equipment required, cues that initiate task performance, and standards for performance.

Observing the incumbents at work allows flexibility in gathering the required data by providing the analyst opportunities to continually evaluate the information obtained.

Disadvantages of the onsite interview are that it is time-consuming, expensive, and its effectiveness depends upon the skills of the job incumbents and job analysts.

1.4.2.2 Written Survey. The use of questionnaires permits the job analysts to interview a large number of people. Questionnaires have the advantages of yielding large amounts of information at a relatively low cost and do not require trained interviewers. The questionnaire must be accompanied by clear instructions since the job analysts will not be present to give directions and explanations. A major disadvantage of a mailed questionnaire is that returns tend to be low, especially if the questionnaire is long and must be filled out on one's own time.

1.4.2.3 Jury of Experts. A jury of experts brings together experienced and knowledgeable personnel to record and organize the data on jobs for which many of the more critical behaviors are not directly observable. This method can effectively supplement onsite observation/job interviews and written surveys. Organizations with limited resources are encouraged to use the jury of experts approach to supplement current job task data. The jury of experts method can be expensive because of the number of personnel involved and the time required to complete the analysis.

1.4.2.4 Group Interviews. In the group interview, job incumbents are assembled to give information relative to their job. The job analyst asks questions about job performance and may ask the group to list relevant job data on forms. The group interview is a relatively inexpensive approach and is particularly useful for gathering data on tasks that cannot easily be demonstrated or observed (e.g., tasks that are

performed only in combat). Because the group interview involves recall rather than recognition, however, it tends to provide inaccurate or incomplete data.

1.5 DEVELOP JOB TASK INVENTORY (JTI)

At this point, sources for the job analysis have been identified. Now the task list must be developed. A task is a definite work action encompassing the smallest, clearly prescribed set of behavioral actions usually performed by one worker. A task has the following characteristics:

- It is described by a work statement that includes an ACTION VERB and an OBJECT. The philosophy that governs the choice of an action verb is to choose the one that tells what ACTUALLY is done when performing the task. If references are used the same wording should be used as that found in the reference.

- It is a statement of a highly specific action.

- It is done in a relatively short period of time (minutes and hours vice days and weeks).

- It must be observable.

- It must be measurable.

- It is independent of other tasks (i.e., done for its own sake).

Answers to the following questions will generate a list of task statements. What does the person doing the job do first? Second? Etc.? Are there SAFETY PROCEDURES to be followed? Does the person doing the job have access to publications, manuals, PQS, MRC's or other job aids?

These statements should meet the task statement standards listed in Figure I-3. Follow these standards in writing task statements.

STANDARD	TASK STATEMENT	EXAMPLE
Clarity	*Use wording that is easily understood.*	*"Compare written description to actual performance."* *But Not* *"Relate results to needs of field."*
	Be precise so it means the same thing to all personnel.	*Use words such as "check, coordinate, assist" with caution—they are vague.*
	Write separate, specific statements for each. Avoid combining vague items of skill, knowledge, or responsibility.	*"Supervise files."* *"Maintain files."* *But Not* *"Have responsibility for maintaining files."*
Completeness	*Use abbreviations only after spelling out the term.*	*"Inventory War-Readiness Material (WRM)" may be followed by "Prepare requisitions for WRM."*
	Include both form and title number when the task is to complete a form, unless all that is needed is the general type of form.	*"Complete Task Description Worksheet (Form No. XXX)."*
Conciseness	*Be brief.*	*"Write production and control reports."* *But Not* *"Accomplish necessary reports involved in the process of maintaining production and control procedures."*
	Begin with a present-tense action word (subject "I" or "you" is understood).	*"Clean" or "Write."*
	Indicate an object of the action to be performed.	*"Clean engine." "Write report."*
	Use terminology that is currently used on the job.	*Use most recent military documentation.*
Relevance	*Do not state a person's qualifications.*	*"Load computer tape."* *But Not* *"Has one year computer training."*
	Do not include items on receiving instruction, unless actual work is performed.	*"Prepare lab report."* *But Not* *"Attend lecture."*

Figure I-3.--Task Statement Standards

In addition to the task statements, the list should include the following:

- References. List documents containing procedures and standards by chapter, paragraph (section), and page number.

- Tools Required to Perform the Task. List all tools specifically mentioned in the references.

- Support Material(s) Required in Performing the Task. Support materials include all items used to perform the task and not categorized as tools, test equipment or support equipment, e.g., soap, rags, sandpaper, grease, paper, pencils, special clothing.

- Support Equipment(s) Required to Perform the Task. Support equipment is designed for and used primarily in support of the task, without regard to evaluating performance, e.g., power units, portable air-conditioning units, jacks, typewriters, clocks, chain falls, and davits;

- Test Equipment(s) Required to Perform the Task. Test equipment is designed and used primarily for evaluating performance or measuring tolerances, e.g., voltmeter, signal generator, micrometer, and lead line.

1.5.1 Refine and Collate Task Lists

Upon completion of the data collection process, several job task lists and a sizable amount of information will have been accumulated. The data must be sorted and consolidated into one task inventory list. At this point, do not worry about the size of the list or about overlapping and duplicating statements. Task identification moves through several cycles of reviewing, reexamining, and rewriting. With each succeeding cycle, the resulting task inventory is more complete and more accurate. A task list is ordinarily developed by studying existing job information, by convening a jury of experts who can detail the requirements of a specific job, or in the case of new jobs, by analyzing similar jobs

2

and by engaging in a concerted work effort with the developers of new hardware and systems.

Once a task list has been developed, it is necessary to decide whether the observation method, the interview method, or a combination of the two will be used to perform the job analyses. Or, in the case where extremely limited resources prohibit these methods, a jury of experts composed of appropriate subject matter specialists must be selected.

1.5.2 Validate Task Lists

The next step is to authenticate the task list by going either in person or by sending a questionnaire to actual job incumbents, verifying the performance of each task on the list, and providing descriptive characteristics for each task. For new equipment or systems that lack incumbents to authenticate the task list, engineering data and specifications must provide the basis for job analyses. Specialists can be convened to verify, qualify, or contest task statements based on technical requirements and/or tasks performed in similar jobs.

1.6 SELECT TASK/FUNCTIONS

Some tasks are seldom required on the job and only minimum job degradation would result if the tasks were not performed. On the other hand, some tasks are highly critical to successful job performance and the complex nature of the task makes training essential. Economic and time consideration require a decision as to which tasks will be selected for training. The purpose of the selection process is to ensure that some form of instruction will be provided for all tasks which require training, and resources will not be wasted on tasks which can be accomplished without extensive practice or formal training.

1.6.1 Establish Selection Criteria

In selecting tasks for training, identify criteria used in making the selection. A task, for example, is not critical to the course mission, is not difficult to learn, can be done with ease, and is performed by only a small percentage of job incumbents or rarely performed at all should not be selected for training. However, it may not be possible to determine these facts about the task if meaningful criteria have not been established and applied to each task during the evaluation process. The following criteria are presented as an aid in selecting tasks for training.

. Percentage Performing. The percentage of job incumbents who actually performed the task.

. Percentage of Time Spent Performing. The percentage of total work time which job incumbents spent on task.

. Task Criticality. A task may be essential to mission success accomplishment, equipment, or personnel welfare and safety even though it is not performed frequently.

. Task Delay Tolerance. A measure of how much delay can be tolerated between the time the need for task performance becomes evident and the time actual performance must begin.

. Frequency of Performance. The likelihood that a task will be performed frequently enough to require training.

. Task Learning Difficulty. The time, effort, and assistance required by a student to achieve performance proficiency.

. Probability of Deficient Performance. The likelihood that job incumbents will fail to perform a task adequately.

. Immediacy of Performance. The time lapse between an individual's assignment to a job and

the time that he or she is expected to perform the task.

Many of the sources used to develop the original JTI will provide data on the above criteria. For economy and efficiency, specific criteria should have been identified in the data collection plan in Section 1.4.

1.6.2 Collect and Consolidate Data

After the criteria for the task selection process have been established, the data for rating each task of each criterion should be collected from a sample of job incumbents. For new jobs, it may be necessary to get the data from survey groups who do similar jobs or from subject matter specialists and technical documentation. The data collected must be sorted and consolidated and presented in a usable form.

1.6.3 Select Tasks for Training

The selection of tasks for training is a judgmental procedure which requires:

. A clear understanding of the duties, tasks, and elements that make up the job

. Analysis of collected data by individuals who are familiar with the job

. An understanding of the resources and the responsibility of the command that make the training choice

. A clear understanding of when and under what conditions training is appropriate.

Once data have been collected and consolidated, the first step in the selection process is to delete those tasks that do not require training. Since all task selection rests upon informed judgment, if there is doubt whether a task should be selected for training, do not reject it at this point; delete only those tasks that clearly would WASTE training resources.

When all tasks that require no training have been eliminated, the remaining list may still contain some tasks for which training is not essential. Therefore, the second step of the process is to organize the list into two categories: (1) those tasks for which training must be provided and (2) those tasks for which training can be considered optional depending upon the availability of resources.

At this point the resources available for training must be determined and taken into account in selecting tasks for training. If it is determined that resources to train the tasks selected are beyond the capacity of the training activity, then the curriculum approval authority must be informed in the cover letter to the JTI.

1.6.4 Define Conditions, Cues, Standards, and Elements

The analysis process is not complete until the conditions under which the tasks are performed, the cues that initiate and guide performance of the tasks, the standards that represent adequate task performance, and the elements of each task are listed for each of the tasks selected for training. Figure I-4 is a sample job data worksheet showing tasks, task elements, conditions, cues, and standards.

1.7 JOB PERFORMANCE MEASURES

Job performance measures are tests used to evaluate the proficiency of a job incumbent on tasks he or she performs when doing his or her assigned job. Conceptually, the ISD process demands a JPM for each task or task cluster selected for training. But since JPM's are designed to measure on-the-job performance in the actual job environment vice a training environment, the cost of adminstration and validation of such measures are generally prohibitive. Therefore, while JPM's are theoretically worthwhile, it is unrealistic to recommend their development except in special instances where the consequences of inadequate performance are especially serious, such as flight training or use of special weapons.

JOB DATA WORKSHEET

JOB TITLE Medical Corpsman (91A10) DOS ________ PAGE NO. 1

DUTY/CODE Applying first aid (A) LEVEL ________ DATE 4/3/1975

ITEM CODE	TASK, ELEMENTS, J.P.M.	CONDITIONS	INITIATING CUES	STANDARDS	NOTES
A-001	Task: Perform first aid measures for drowning.	Performed in all climatic conditions generally outdoors, in all atmospheric conditions including toxic atmospheres. In a non-toxic atmosphere, a pharyngeal airway device, if available, may be used in administering artificial respiration. In a toxic atmosphere, the M1 resuscitation tube may be used with the M17A1 field protective mask to administer artificial respiration. Mouth-to-mouth, mouth-to-nose, and mask-to-mouth methods require a high degree of respiratory endurance.	Casualty is unconscious and is not breathing. There may or may not be a slight pulse.	All steps listed below performed in order listed and to standard listed for each step.	Detailed information listed in FM-21-11. SOP is to begin external heart massage and resuscitation procedures even when there is no pulse.
	ELEMENTS:				
A-001-001	Position casualty on his back.	Casualty may have other minor or serious injuries.	Same as A-001.	Victim should be immediately repositioned on back without further injury. Movements must be made carefully but quickly.	Severe bleeding from other injuries requires attention concurrent with attempt to restore breathing, but (con't)

Figure I-4 Example of A Completed Job Data Worksheet

If JPM's are deemed necessary for your development project, you should refer to Block I.3, pages 156-212 of NAVEDTRA 106A for detailed guidance.

1.8 SELECT INSTRUCTIONAL SETTING

In this section, the most effective and most appropriate instructional setting will be selected and submitted to the curriculum approval authority for approval.

1.8.1 Types of Settings

There are three basic types of instructional settings used for training: on-the-job, fleet schools, and resident schools.

1.8.1.1 On-The-Job Training (OJT). The following examples illustrate two common strategies for the accomplishment of training in the OJT setting.

- On-the-Job with Job Performance Aids (JPA). A JPA is a document, device, guide, or tool which supplies information and guidance to aid the job incumbent in prforming the task while on the job. If a JPA can be used to teach a task and aid in the student's performance, it is impractical and inefficient to send people to a formal school for such training.

- On-the-Job with On-board Training (OBT) Packages. An OBT package is a self-contained, self-instructional study unit that provides training in the professional, technical, and military areas of an individual's assigned duties or that offers independent study for advancement and self-improvement. Such packages allow students to perform in the job environment while learning additional skills, thus avoiding the high cost of temporary duty under instruction (TEMDUINS) at a formal school.

1.8.1.2 Fleet Schools. Class F schools provide team training to officer and enlisted

personnel of the fleet who normally are on duty or en route to duty as members of a ship's company. Class F schools also provide individual training such as refresher, operator, maintenance, and technical training of less than 13 calendar days established to meet the needs of the fleet or type commanders.

1.8.1.3 Resident Schools. A resident school provides formal Navy training in an established school at a planned and scheduled training activity. Training is normally conducted in a setting to which students are detailed on permanent or temporary duty orders for full-time training purposes.

. Class R Schools provide general indoctrination in basic military subjects to recruits upon initial enlistment or induction to assist in early adjustment to military life.

. Class A Schools provide the basic technical knowledge and skills required for job entry level performance and further specialization training. Class A schools also include some officer courses such as Communications Officer, ASW Officer, etc.

. Class C Schools provide training in advanced technical knowledge, skills, and techniques to perform a particular job in a billet. Class C schools also provide training in any course which awards a NEC or is 13 calendar days or longer and does not conform to the definition of a Class A school.

. Class P Schools provide officer acquisition programs designed for undergraduate education and/or indoctrination and basic training in fundamentals, preliminaries, or principles to midshipmen, officer candidates, and other newly commissioned officers (except those acquired through Class V programs).

. Class V Schools provide training in knowledge and skills which lead to the designation of Naval Aviator or Naval Flight Officer.

1.8.2 Setting Recommendations

Recommendations on instructional settings for tasks selected for training are made by the preparing activity, reviewed for appropriateness by the activities affected, and approved by the curriculum approval authority. The preparing activity will establish and maintain liaison with all participating activities to make sure that all agree that the training requirements are considered when recommending tasks to instructional settings, and that all agree upon the instructional setting designations. The curriculum approval authority will convene meetings, as needed, to resolve problems and to obtain data on the status of course development.

1.8.3. Prepare Final JTI for Submission

Figure I-5 provides a sample format for submitting proposed job tasks to higher authority for approval. The exact format of the final Job Task Inventory, however, will vary depending on the nature of the job being analyzed and the type of course being developed or revised:

1. For new courses or Type A Revisions, job task listings will be all inclusive, will be prioritized, will include the rationale supporting the proposal, the source of the job task inventory, and if appropriate, a comparison with the job tasks included in the existing course of instruction.

2. For Type B Revisions, the JTI will include as a minimum, a listing of job tasks recommended for deletion or addition to tasks trained in the existing course, and rationale supporting the proposed changes.

PRIORITY IDENTIFIER Duty	Task	DUTY AND TASKS TITLES	TASK SOURCE	INSTRUCTIONAL SETTING Present	Recommend	IMPACT ON EXISTING COURSE	RATIONALE
K		GB-2 LOW PRESSURE OXYGEN/NITROGEN PRODUCER SYSTEM PREVENTIVE MAINTENANCE	PQS 302.31 through 302.29 and 302.41 through 302.48 NOTAP Q-15 through Q-18, V-376, and V-557				
K	1	Perform acetylen contamination test	MIP A-136/15-B6 64 E25J Y	C	C	0	
K	2	Obtain and forward sample for infrared spectrophotometer analysis	MIP A-136/15-B6 64 E25L N	C	C	0	
K	3	Inspect foundation bolts/fasterners	SME	C	OJT	-	OJT of this task provides more realistic setting with no derogation to job function, thus relinquishing limited lab time for more critical tasks.
K	4	Test oxygen/nitrogen system relief valves	SME	C	OJT	-	(SAME AS ABOVE)
K	5	Test turboexpander oil relief valve	SME	C	OJT	-	(SAME AS K 3)
K	6	Renew turboexpander lube oil and filter elements	MIP A-136/15-B6 92 B87B Y	C	C	0	
K	7	Accomplish odor and sniff test (Type 2 liquid sample)	MIP A-136/15-B6 85 H67N N	C	C	0	
K	8	Clean and inspect liquid oxygen product filter	SME		OJT	0	This task was added due to the frequency of cleaning required for this filter based on the experience of SMEs
K	9	Clean and inspect solenoid valves	MIP A-136/115/-B6 92 B87E N	C	C	0	
K	10	Renew valve stem packing	SME	A	A&C	+	Lab session review recommended by SMEs.
K	11	Clean and inspect regenerator valve(s)	SME	C	OJT	-	(SAME AS K 3)
K	12	Clean and test regenerator check valve(s)	MIP A-136/15-B6 85 H67Q N	C	C	0	
K	13	Recharge nitrogen product sensor	MIP A-136/15-B6 85 H67R N	C	C	0	

Figure I-5.--Sample Job Task Inventory Format

PHASE II

DESIGN

2.0 INTRODUCTION

Beginning with Phase II, the ISD model is concerned with designing instruction using the job analysis information from Phase I. Phase II involves one of the most important and critical segments of the ISD process -- the identification and design of the terminal and enabling objectives that the student must accomplish in order to satisfactorily complete the course. The learning analysis process required to accomplish this task involves the development of learning hierarchy charts from which are produced learning objectives. Criterion referenced tests are designed to match the learning objectives. Finally, a sequence of instruction is designed for the learning objectives.

Required Documentation: List of learning objectives, terminal and enabling, for a course.

2.1 DEVELOP LEARNING OBJECTIVES

This section treats a critical segment of course development -- identification and design of learning objectives. The orderly progression from the tasks selected for training to an organized set of learning objectives is the learning analysis process.

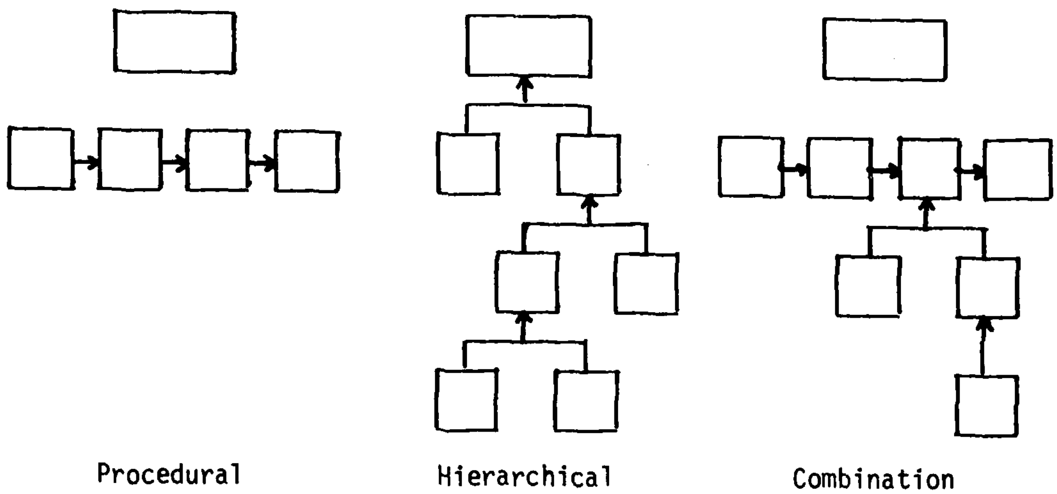
2.1.1 The Learning Analysis Process

While the JTI lists tasks an incumbent performs on the job, learning objectives describe the knowledge, skill, or task the student must master in order to perform the JTI tasks. Breaking down a task statement into its individual components and their interrelationships is called developing a learning hierarchy. It is from a learning hierarchy that the learning objectives are developed.

2.1.1.1 <u>Assessing Target Population Entry Level.</u> Before the learning hierarchy is developed, the course target population must be identified. A thorough study should be made of all available documentation which describes the target population. Such factors as rating, physical requirements, and established Armed Services Vocational Aptitude Battery (ASVAB) selection criteria should be examined. When an existing course is revised, the learning objectives of any prerequisite training must be reviewed. This is also true if a course is being developed that will be included in established training pipelines. The entry skills of the target population shall be documented to ensure that there are no problems transitioning from previous training to the course being developed. NEVER ASSUME the target population has been provided with all prerequisite knowledges or skills. Analyze, document, and verify all entry level skills.

2.1.1.2 <u>Approaches to Developing Learning Hierarchies.</u> All tasks selected for training will be reflected in a learning hierarchy, but not every task will have a unique learning hierarchy. A task may itself be part of a more complex task. The number of hierarchies and their complexity are determined by the tasks selected and the nature of the duties and jobs they reflect. Developing the hierarchy requires that the most complex task be broken down into its simpler skills until entry level skills of the target population are achieved.

There are three basic approaches which may be taken to develop the learning hierarchy: the procedural approach, the hierarchical approach, and the combination approach. The following illustration shows examples of each. The method used will depend upon the task to be performed, as each will identify the relevant subordinate items which the student must master in order to perform the task.



. PROCEDURAL APPROACH. Of the three approaches, the procedural approach is the simplest. It is recommended for use when the task to be performed is a procedure, which is essentially a series of steps which must be performed in sequence. A procedure does not require the student to master any other skills or knowledges and the outcome of each step is fixed. Each step is independent and can be taught separately, but each step is initiated as the result of the previous step. An example would be calibrating a piece of equipment as shown in Figure II-1.

TASK: Calibrate a Type 545B Oscilloscope

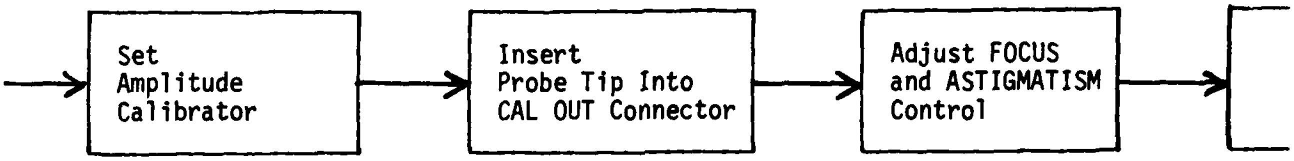


Figure II-1.--Example of a Portion of a Procedural Approach

When following the procedural approach, the developer should be aware that:

. Not all the steps may be identified in governing directives and manuals.

. More than one person may be required to perform the steps.

. Some steps will be performed simultaneously.

If the operational equipment or forms are available, the developer should observe a subject matter expert (SME) performing the task. Using a checklist from the governing directives or manuals, the observers should note any steps performed but not listed in the documentation.

At the end of the process, the developer should be able to:

. Identify all directives, manuals, NWP's, etc. which specify the steps.

. Identify when the procedure is followed.

. Identify how the procedure is begun and what initiates the first step in the procedure.

. Identify all steps in sequence.

. Identify when the procedure is stopped.

. HIERARCHICAL APPROACH. The hierarchical approach identifies subordinate skills and knowledges which must be achieved in order to accomplish the task. These subordinate skills and knowledges are identified by asking a series of questions about the task. The developers begin by asking "What does the student need to know or be able to do in order to accomplish this task?" This question should allow the developer to identify critical subordinate skills, knowledges, or tasks to be learned. The same question is asked about each of the subordinate skills, knowledges, or tasks until no additional items can be identified, or until the target population entry level is reached.

It is nearly impossible to be 100% assured that all subordinate skills, knowledges, or tasks have been identified. A complete hierarchy is rarely produced in one attempt. To be as confident as possible requires several attempts to identify all the subordinate skills, knowledges, and tasks. It is also recommended that more than one SME check the hierarchy and all pertinent references, paying particular attention to relationships of items. A good check on the completeness of the hierarchy is to begin with the simplest element and work up to the task. Throughout this process, it is helpful to note how subordinate elements are interrelated and how they support the task. If a logical progression CANNOT be followed, the hierarchy is INCOMPLETE.

The learning hierarchy shown in Figure II-2 was developed using a hierarchical approach. In this example, the simplest skill or knowledge was reached in six levels. In other situations, as many as 10 or more levels may be identified.

. COMBINATION APPROACH. For those tasks consisting of a series of complicated steps requiring complex decision making, the combination approach is used. Each step requires the individual to learn many supporting skills, knowledges, or tasks in order to make decisions on how to perform each step. A good example is the development of instructional materials in accordance with this manual (Figure II-3). The procedures specify certain steps (analyze, design, develop, implement, control) which must be followed. In order to do each of these steps, the curriculum developer must learn a number of skills or knowledges (i.e., how to develop a JTI, how to construct objectives) in order to complete one step and move on to the next. Actions which go on within the steps are controlled by the product(s) from the previous step.

2.1.1.3 Determining the Learning Analysis Approach. To determine which approach to take, the following guidelines should be used:

. If the task is not the last element to be performed, but rather it is accomplished by performing each of the steps, a PROCEDURAL approach is followed.

. If it is impossible for the student to learn portions of the task without first learning preceding skills or knowledges, a HIERARCHICAL appoach is followed.

. If it is neessary to follow a series of steps, and doing a particular step requires the student to learn subordinate skills or make decisions based on subordinate knowledges, a COMBINATION approach is followed.

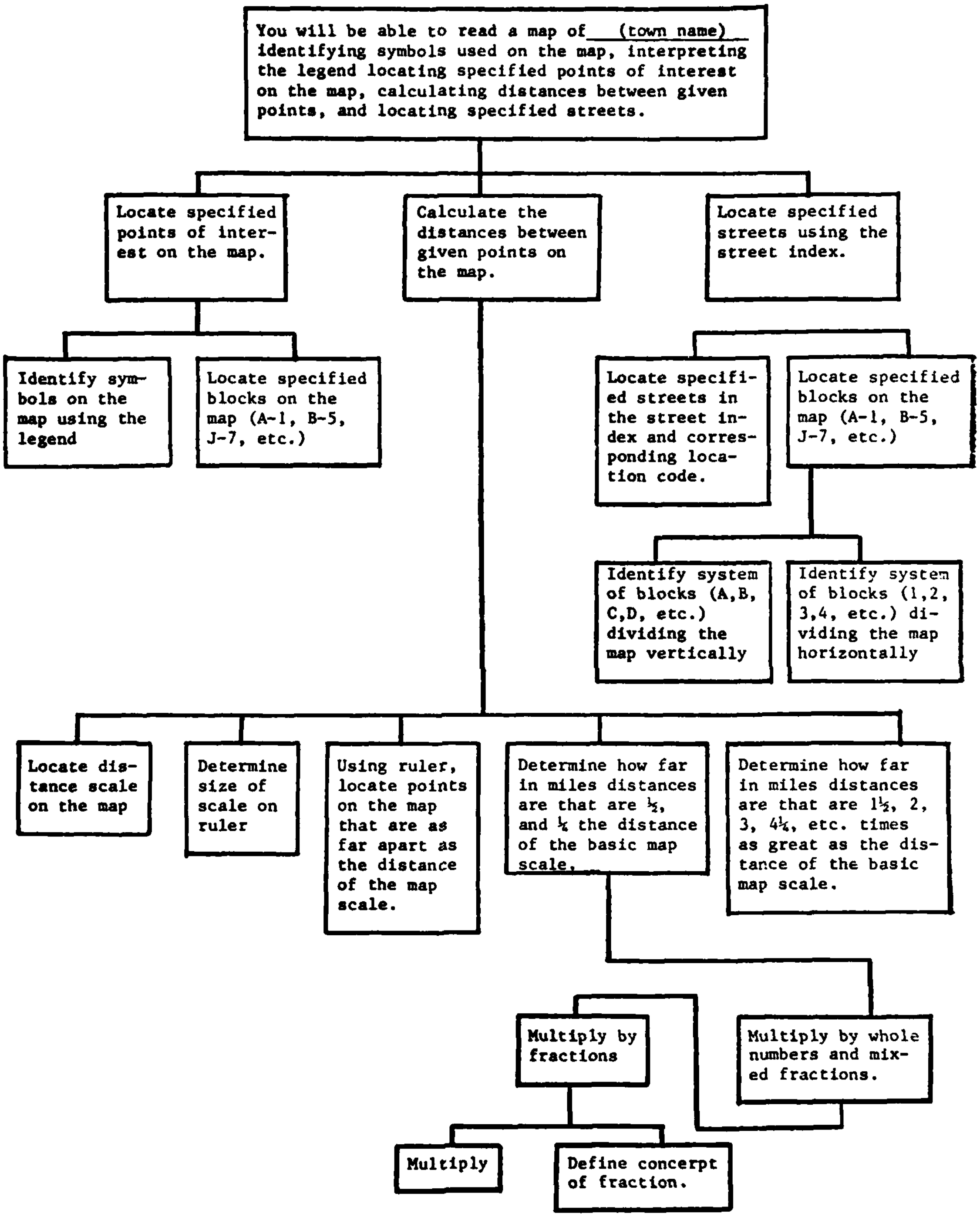


Figure II- 2.--A Learning Hierarchy Developed Using the Hierarchical Approach

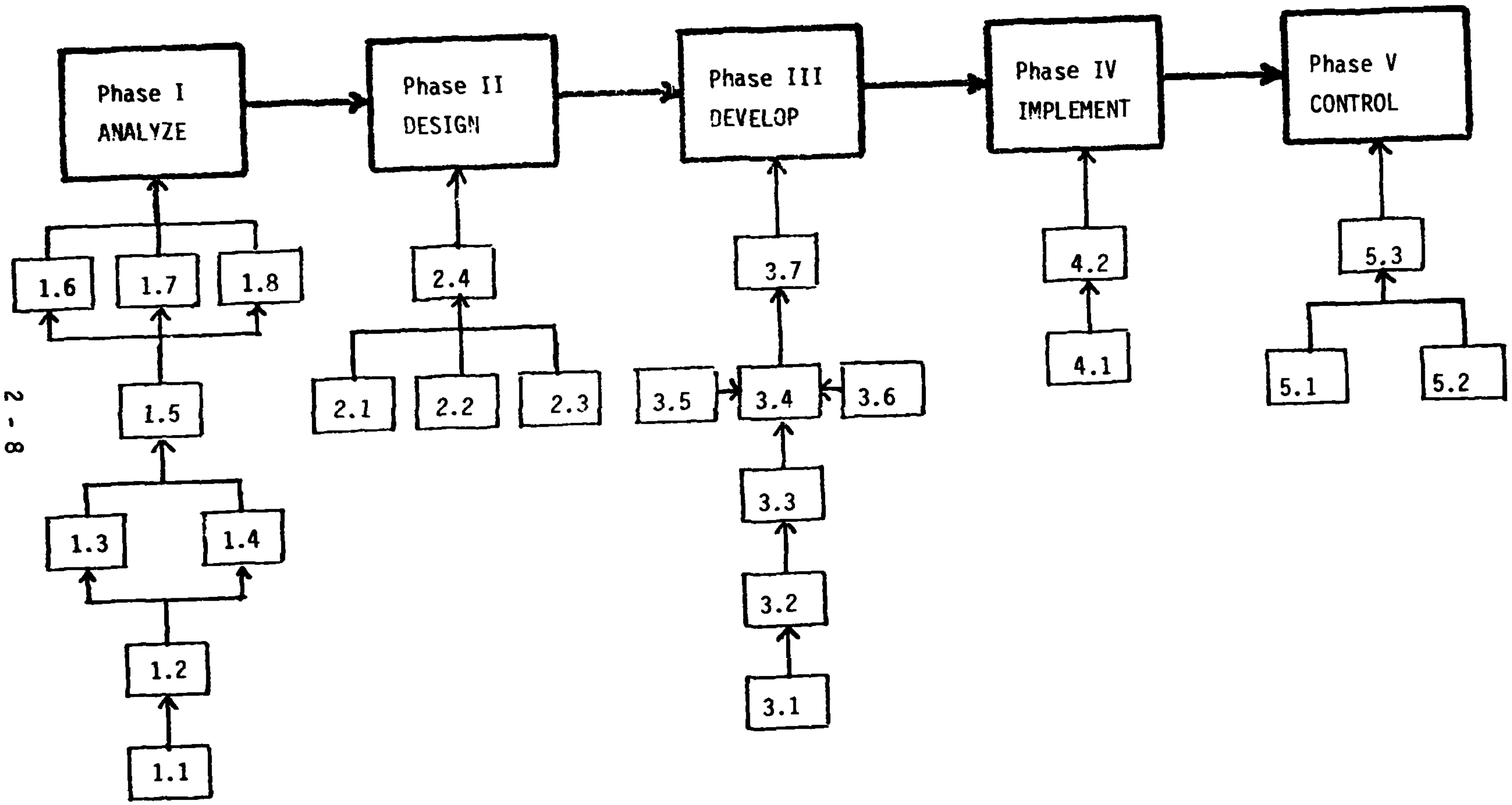


Figure II-3.--A Learning Hierarchy Developed by Using the Combination Approach.

2.1.1.4 Construction of a Hierarchy. To construct a learning hierarchy, perform the following steps:

Step 1: Group the tasks. Loosely group the tasks selected for training according to a major piece of equipment, system, or duty to be performed.

Step 2: Select the most, or next most complicated task from the group. The following considerations shall be given to the selection of the most complicated task:

. Select a task which involves a large part of the job time.

. Select a task which requires many sub-procedures for its completion.

. Select a task which tends to be one of the most difficult.

Step 3: Divide the major task into component subtasks.

The developer, with the assistance of other SME's, analyzes the performance components using the procedural, hierarchical, or combination approach. Also to be identified are:

. Each operator/maintainer decision points.

. Tasks which must be performed from memory.

. All job aids/checklists that are used in performing a task.

Step 4: Determine if there are too many subtasks or elements. The developer shall determine whether any of the following criteria applies to the subtasks or elements:

. Any subtask is a lower-level component of another subtask listed.

. Any subtask repeats another subtask listed.

- Any subtask is not necessary to the accomplishment of the main task.

If it is determined that there are too many subtasks, proceed to Step 5; if not,go to Step 6.

Step 5: Narrow the list to the minimum set of subtasks necessary to perform the task. The list of subtasks may be narrowed in one or more of the following ways:

- Eliminate any overlapping subtasks.

- Eliminate any task that is part of another subtask on the list.

- Eliminate subtasks that are not essential to performance of the main task.

Step 6: Determine whether there are too few subtasks. If after having learned all the subtasks, receiving simple instructions, and some practice, the student is unable to perform the main task, then one or more of the subtasks has been omitted. These additional subtasks must be identified and added to the list.

Step 7: Arrange the tasks in a hierarchy.

- Note Cards. As a subordinate skill, knowledge, or subtask is identified, each statement is written on a separate note card. It may be desirable to use multiple colors - one color for the task and another for the elements. It is advisable to start with 30 to 40 cards. After all the elements are identified, arrange the cards on a large surface (i.e., table top or bulletin board) starting at the top center with the task, and sequence the cards. Using note cards allows maximum flexibility to arrange and rearrange the elements until the proper sequence is established. When the sequence is established, a permanent record should be made similar to the hierarchy shown in Figure II-3.

. Large Sheet of Paper. A large sheet of butcher paper, newsprint, or chart paper may be used to record the elements. This method does not provide the flexibility of the note card approach, but it does give the total picture at a glance. As in the case with the note card approach, once the final sequence is determined, a permanent record should be made for the audit trail.

. Standard Paper Size. Multiple blocks are drawn on a standard size sheet of paper into which the task elements are written (Figure II-4). A single element is recorded in each block and lines can be added connecting the blocks to show the relationship between elements. This approach also lacks the flexibility of the note cards, but it can be more easily stored than either of the previous methods.

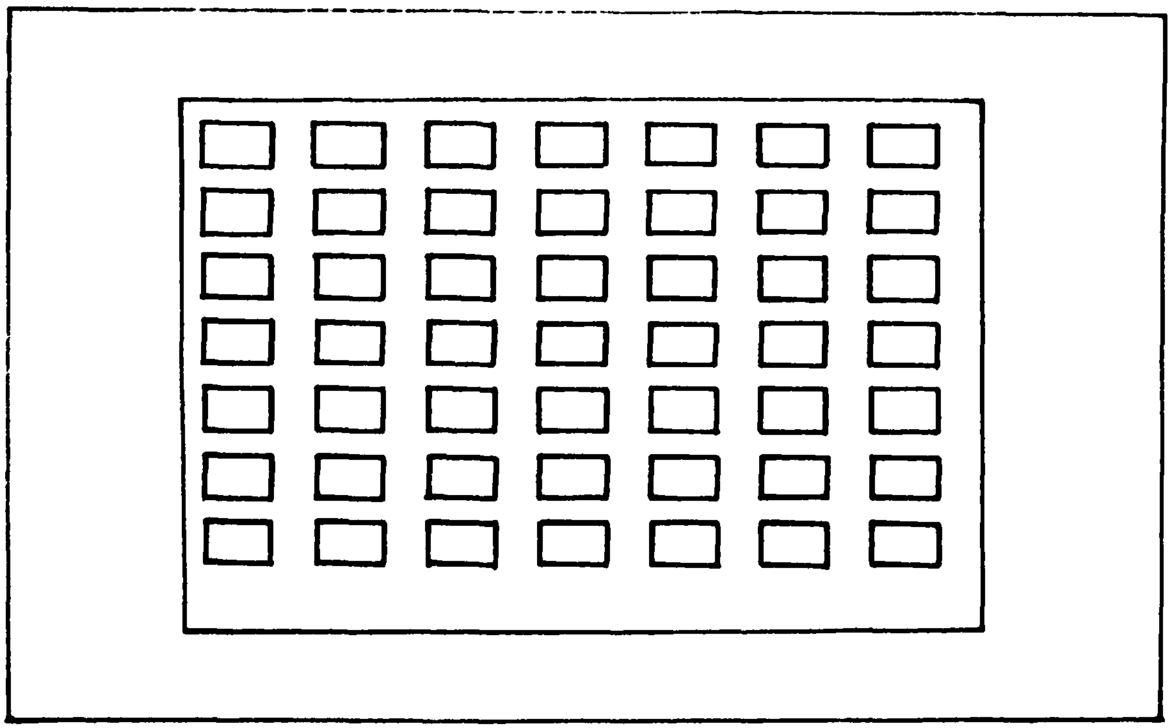


Figure II-4.--Standard Paper Size Hierarchy

2.1.2 Writing Learning Objectives Derived from Learning Hierarchy Charts

Completed hierarchy charts specify the tasks, task elements, and supporting knowledge and skills which must be mastered by the students. The final phase of the training analysis process is the development of learning objectives from ALL tasks, task elements, and supporting knowledge and skills from the hierarchy charts.

2.1.2.1 Characteristics of Learning Objectives. All learning objectives are DEFINITE learning specifications written in behavioral terms which specify exactly what the student must be able to do after having received instruction. ALL learning objectives contain three essential elements: a statement of the BEHAVIOR, or performance expected of the student as a result of the learning experience; the CONDITIONS under which the behavior is to be exhibited; and the STANDARDS (criteria) to which the behavior will be performed or demonstrated. In the example below, the BEHAVIOR, CONDITIONS, and STANDARD are indicated with the letters B, C, and S.

EXAMPLE: Given a trainer having a semiconductor trapezoidal wave generator circuit, multimeter, and oscilloscope measure the output amplitude, rise time, and jump voltage within +/- 10% accuracy.

. Given a trainer having a semiconductor trapezoidal wave generator circuit, multimeter, and oscilloscope - CONDITION (C)

. measure the output amplitude, rise time, and jump voltage - BEHAVIOR (B)

. within +/- 10% accuracy. - STANDARD (S)

The format may vary for writing learning objectives; the inclusion of BEHAVIOR, CONDITIONS, and STANDARD cannot. Look at another example:

. REPLACE the Furnace Access Plug Refractory in the Furnace Access Plug of a Pressure Fired Boiler - BEHAVIOR (B)

. given Supercharged Boilers, Volume 1, NAVSEA 0951-LP-003-9010, Section 3 and Supercharged Steam Generating System Repair and Overhaul Manual, NAVSEA 0951-020-5010. - CONDITIONS (C)

. Satisfactory completion standards will be in accordance with U. S. Navy Main Propulsion Steam Generating Plant and Inspection and Certification Program Manual, NAVSEA 0951-021-7010. Procedures will be performed without error. - STANDARD (S).

Still, other examples:

SELECT the three (3) functions applicable to the use of a Transportation Control and Movement Document (DD From 1384), from a list of five (5), in accordance with NAVSUP P-284 and FASOINST 4440.92 Series, without error.

LIST the four (4) combat subsystems that comprise the TERRIER Guided Missle Weapons System as specified by NAVSEA OP 4273 and NAVSEA OP 4163, from memory, without error.

LABEL on an Assignment Sheet, the Radar Subassemblies which are designated by NAVSEA OP 4059, Volume 1, a Pulse Track Transmitter without error, within ten (10) minutes. Access to the AN/SPG 55B (CWAT) laboratory and use of NAVSEA OP 4059 will be allowed.

PERFORM an instructor-specified portion of a cyclic maintenance inspection, as a member of a four-man supervised crew, on the B759 Elliott Supercharger, in accordance with Supercharged Steam Generating System Repair and Overhaul Manual, NAVSEA 0951-020-5010, procedure 3.1, page 3.1.6-3.1.7, paragraph S and MRC's F-38 and C-1. Procedures will be performed without error, and all safety precautions will be observed.

MAINTAIN the AN/SPG-55B (CWAT) Radar Set and its associated equipments under non-emergency conditions, in a training environment, by PERFORMING specified scheduled and unscheduled maintenance actions required to sustain the radar operationally in accordance with standards and specifications as stated in NAVSEA OP 4059 and applicable PMS documents for the radar and its associated equipments.

PERFORM the cleaning, inspection, and lubrication scheduled maintenance actions specified on the current AN/SPG-55B (CWAT) Maintenance Index Page as integrated in the Student Qualification Record Form, under the direct supervison of a qualified instructor, USING the procedures and standards stated on the MRC, without error.

PERFORM repair/replacment procedures USING the CMC's specified by the current AN/SPG-55B (CWAT) Maintenance Index Page as integrated in the Student Qualification Record Form under the guidance of a qualified practical instructor, without error.

LOCATE any replaceable component of the AN/SPC- 55B Radar listed in NAVSEA OP 4059 Volume 2, by RECORDING the figure number, page number, and alphanumeric page coordinate of each component, given the circuit symbol, USING NAVSEA OP 4059, without error.

Given

-- Schematic diagrams for Interrogator Set AN/UPX-23

-- Radar Test Set AN/UPM-137A

-- 10:1 Probe and tips

-- Technical Manual for Interrogator Set AN/UPX-23

-- Assorted coaxial cables and connectors

-- Flashlight

The student will

-- TROUBLESHOOT to the defective component a minimum of two out of three instructor inserted malfunctions in the Interrogator Set AN/UPX-23 within a time limit of 30 minutes for each trouble while observing all standard safety precautions.

Given

-- Technical Manual for Interrogator Set AN/UPX-23

-- Operation, Maintenance, and Maintenance Standards for Radar Test Set AN/UPM-137A

-- Alignment, Checkout, and Adjustment procedures for AIMS (IFF) subsystem in Radar Set AN/CPN-4A, NE 0967-LP-426-8150

-- Maintenance Requirement Cards for Interrogator Set AN/UPX-23

-- Radar Test Set AN/UPM-137A

-- 10:1 Probe and tips

-- Assorted coaxial cables and connectors

-- Flashlight

The student will

-- MEASURE transmitter power out with an accuracy of +/- 0.5 dB

-- MEASURE transmitter frequency with an accuracy of +/- 0.2 MHz

-- MEASURE receiver sensitivity to within the standards set forth in Alignment, Checkout and Adjustment procedures for AIMS (IFF) subsystem in Radar Set AN/CPN-4A (NE-0967-LP-426-8150) and/or MRC while observing all standard safety precautions.

In each of the examples above, the format is somewhat different, but the BEHAVIOR, CONDITION(S), and STANDARD are explicit and leave no doubt as to what the student must do.

Properly stated learning objectives are the foundation for most of the instructional system development (ISD). Some of the benefits are shown in Figure II-5.

PROPERLY STATED OBJECTIVES

- Establish clear-cut instructor and student goals.
- Provide a firm basis of criterion-referenced measures (tests).
- Permit selection of the most suitable instructional strategy.

Figure II-5.--Benefits of Properly Stated Objectives.

.THE BEHAVIOR PERFORMANCE ELEMENT OF LEARNING OBJECTIVES. An instructor cannot read the mind of the student to see how well (s)he understands. Only through some observable (overt) activity of the student can the extent of his/her knowledge or skill be measured. So the BEHAVIOR (performance) element of a learning objective should state specifically what the student does.

To reduce ambiguity, use action verbs. Unless you specify student behavior with an action verb, the student may do something other than intended. Of course, you can think of "good" verbs, but there are also "poor" verbs which do not accurately communicate desired student actions. The verbs you select to convey desired behavior should reflect actions that are observable, measurab' . and verifiable.

Behaviors such as:

Identify

Demonstrate

State

Describe

Explain

Define

Discriminate

Classify

are not specific and are open to interpretation as to WHAT the student must do. If these behaviors are necessary they must have a qualifying verb that will specify the EXACT behavior the student is to demonstrate. For example:

Identify, by SELECTING 3 of the 5 following
statements - - -.
, by MATCHING - - -.
, by completing incomplete sentences
(fill-in-the-blanks)

Demonstrate, by WRITING the formula - - -.
, by MATCHING - - -.
, by COMPUTING - - -.

State in WRITING - - -.
by LISTING - - -.

Describe in WRITING - - -.
by LISTING - - -.
by SELECTING - - -.

Explain in writing - - - .

Define by WRITING - - -.
by MATCHING - - -.
by LISTING - - -.

Discriminate by SELECTING- - - .

Classify by WRITING - - -.
by MATCHING - - -.

The BEHAVIOR MUST ALWAYS be observable (overt). Identify, demonstrate, state, describe, explain, define, discriminate, classify, etc., are not observable behaviors (covert) and cannot be tested objectively.

Ideally, the behavior described in the objectives (called the criterion behavior) will be the same as required by the job (skill or knowledge to be identified as a TERMINAL OBJECTIVE). If the job behavior involves typing letters, the criterion behavior should involve typing letters. On the other hand, some job behaviors cannot be duplicated in the training environment. This may be due to safety, economic, or other practical considerations. For example, one job behavior (Terminal Objective) might require astronauts to "hop around on the moon for extended periods of time without hurting themselves or their equipment." It is clearly impossible to EXACTLY duplicate this behavior in training. So, how would the performance part of the objective be stated? The principle is: The criterion behavior should be as close as possible to the job behavior. For "hopping around on the moon," the condition of the behavior makes it clear that the training behavior does not occur on the moon. So, an abbreviated form of this objective might be:

"Given a simulated moon environment, space suit, etc., the astronaut will hop around for . . . "

Note that this objective does not require any of the following behaviors:

- 500 deep-knee bends
- running 5 miles in 40 minutes

- naming the parts of a space suit

- listing the principles for hopping on the moon

These and many other supporting knowledge and skills may all be necessary training (enabling) behaviors, BUT they are not the criterion (TERMINAL) behavior.

. THE CONDITION(S) ELEMENT OF LEARNING OBJECTIVES. A properly prepared learning objective states the limits or conditions of student performance. This second part of the learning objective describes the important aspects of the performance environment. Have the students had prior experience or training? What do the students have to work with? Can they select their own tools? Are the students allowed to use notes they have taken on the subject? Are technical publications, job aids, or checklists available as a starting point? Several sample statements of condition(s) are shown in Figure II-6.

. THE STANDARD ELEMENT OF THE LEARNING OBJECTIVES. The third requirement for a well-prepared learning objective is a stated (or clearly implied) standard of performance. The criteria for standards, completeness, and accuracy, are summarized in Figure II-7.

"Given the diameter of a sphere and the appropriate formula, . . . "

The student doesn't have to memorize or derive the formula. The student solves the problem using the formula provided.

"Field-strip and reassemble a M-16 rifle under conditions of total darkness, . . . "

This implies the student will be provided with the rifle, and requires that the student strip and reassemble the weapon in complete darkness.

"Using available library resources . . . "

"Given examples of long-range management plans and non-examples which have not been previously present . . . "

The purpose of presenting examples and non-examples which have not been presented before is to be sure that the student has not merely remembered or memorized specific examples and (or) non-examples of the concept during instruction.

"Without knowing their behavior is being observed, recruits will demonstrate respect for the flag during retreat by saluting."

Figure II-6.--Examples of Conditions.

CRITERIA FOR GOOD STANDARDS	WHAT IS SPECIFIED
COMPLETNESS	The precise nature of the output. Number of features that output must contain. Number of steps, points, pieces, etc. that must be covered or produced. Any quantitative statement that indicates acceptable porition of the total.
ACCURACY	How close to correct must the performance be. Exact numbers reflecting tolerances. Values or dimensions that the acceptable answers/performance can assume.

Figure II-7.--Criteria for Standards in Learning Objectives.

The student's action will result in an output, the quantity or quality of which is the standard of performance. You must determine which one or more of the six types of standards shown in Figure II-8 the student will have to meet.

NO	DESCRIBE STANDARDS BY	EXAMPLE
1	Referring to a Standard Operating Procedure	"Given the situational requirements for an instrument approach and the local airfield regulations, perform the procedure the pilot follows to complete an instrument landing. The performed steps will be IN CORRECT ORDER AND WILL COMPLY WITH NAVY INSTRUCTIONS AND LOCAL REGULATIONS."
2	Implying the standard of NO ERROR	"Given the diameter of a sphere and the appropriate formula, use a calculator to compute THE EXACT SURFACE AREA OF THE SHPERE." Adding "He/she will perform without error" would not increase the requirement for accuracy.
3	Specifying minimum acceptable level of performance	"Using a slide rule, multiply two three-digit numbers and write THE ANSWER TO THE NEAREST TENTH." This clearly states the degree of accuracy required for satisfactory achievement of the objective.
4	Specifying the time requirements	"From a 200-word rough draft, type a letter WITHOUT ERROR AT A MINIMUM RATE OF 40 WORDS PER MINUTE." Time is an important factor, so it is included in the objective.
5	Specifying the rate of production	"From a rough draft of a final report, type pages without error AT A MINIMUM OF 20 PAGES PER DAY." The amount produced daily is an important factor, so it is included in the objective.
6	Specifying qualitative requirements	"Given a misadjusted carburetor and necessary tools, adjust the carburetor to idle SMOOTHLY at 500 rpm." Smoothness is a qualitative standard.

Figure II-8.--Six Types of Standards for Objectives.

3

2.1.3 Classification of Learning Objectives

All learning objectives can be classified as Terminal or Enabling.

TERMINAL OBJECTIVE--A terminal objective is a specific statement of the PERFORMANCE expected from a student as the result of an experience, expressed in terms of the BEHAVIOR to be exhibited, the CONDITION(S) under which it is to be exhibited, and the STANDARD to which it will be performed. Terminal objectives should translate directly to the tasks performed on-the-job.

ENABLING OBJECTIVE--An enabling objective is a specific statement of the BEHAVIOR to be exhibited, CONDITION(S) under which it is to be exhibited, and the STANDARD to which it will be performed. Enabling objectives must be written with conditions and standards appropriate to the TRAINING ENVIRONMENT, and include knowledge/skills which support a terminal objective. Figure II-9 shows examples of learning objectives.

The following general assumptions may be made about conditions and standards:

- Many objectives contain "implicit" or implied conditions and standards. Unless otherwise stated in the objective, it will be assumed that the student is to perform under normal classroom conditions, is given paper and pencil, and is given appropriate instructions.

- Unless otherwise stated, it will be further assumed that the student will write all responses, and that the responses must be "100% correct." Therefore, when an objective says "state" or "recall," we will assume this means "write from memory with 100% accuracy."

- These objectives are taken "out of context." Therefore, some of the appropriateness decisions will be difficult to make. In general, we will assume that these objectives are from apprentice-level courses.

Behavior	Condition	Standard
INSPECT area for physical security violations	Student will follow a prescribed route where physical security violations have been imposed	Complete log must reflect location and type of all imposed physical security violations
COMPUTE displacement for any class ship	Given draft readings and required plans and tables	Displacement computed +5% of the actual answer
ADD a column of numbers consisting of 6 to 10 numbers having 5 digits or less	Without using a calculator	Time limit: 10 minutes for 5 problems
IDENTIFY the five basic types of fingerprints	Contained among 12 sample prints on a variety of typical surfaces. At least half of the prints will contain a moderate degree of smearing or smudging	At least 9 of the 12 prints must be correctly identified
IDENTIFY the parts of the M16 rifle by name and function	Using the actual rifle	(100% implied)
EXPLAIN how the product of two numbers can be obtained through the use of logarithms	A logarithm table is to be used. Explanation must include the procedure of interpolation	(100% implied)
DEFINE force in terms of mass and acceleration	In your own words	(100% implied)
RIG and LOWER scaffolding for side-cleaning	Scaffolds and associated gear are provided. Student will direct efforts of one assistant	Lines must be securely fastened and scaffolding must hold an 800-pound load. Adherence to all safety precautions is mandatory
DON XZ type chemical defense protective clothing and Mk V gas mask	Using protective clothing provided	No openings in dress
TIE a clove hitch	Around a stanchion, using a 1-inch line	Hitch must not slip under a 50-pound pull
FORM and SOLDER the following splices: Western Union, rattail, staggered, fixture, and knotted-top joints	Use of illustrations showing splices is permitted	Splices must pass instructor inspection for good mechanical and electrical connections with standard sample board
DEMONSTRATE an understanding of the Code of Conduct	By explaining why obedience to the Code is mandatory and by acting the part of a POW interrogated by the instructor in a role-playing exercise	(Not applicable)
EXPLAIN the importance of the five basic principles of good leadership	At least one example taken from the student's own Navy experience shall be given for each principle. Explanations are to include the results of failure to adhere to the principles	(Not applicable)

Figure II-9.--Examples of Learning Objectives.

2.1.3.1 Learning Objective Analysis Worksheets (LOAW). The LOAW, CNET-GEN 1550/4 (11-76), provides a convenient means of keeping track of all objectives, both enabling and terminal. The LOAW is an essential document which will be used repeatedly throughout Phases II (Design) and III (Develop) of the ISD process. Every terminal and enabling objective developed for a course will be entered on an LOAW. Examples of completed LOAW's for a terminal and enabling objective are contained in Figures II-10 and II-11.

2.1.3.2 Identify Associated Equipment. As each learning objective is written on the LOAW, all the equipment required to perform the specific objective must be identified. It is also necessary to indicate whether the equipment is available in the training activity. As learning objectives are written, it is vital to the rest of the curriculum design and development process that they accurately describe equipment available and conditions reproducible in the actual setting in which achievement of the objectives will be demonstrated. Suppose the action statement for a learning objective states: "Monitor pressure, temperature, and liquid level indicating devices at your watch station and record any indications as normal or abnormal . . . ." The equipment necessary to carry out the learning objective shown on the LOAW must be present in the learning environment, and the student must actually do what the learning objective states will be done. If, on the other hand, the school does not have, or cannot simulate "indicating devices," then, the learning objective will not state that the student will use them.

. IMPORTANCE OF AN ACCURATE LOAW. After all learning objectives have been written or transcribed to the LOAW, you will have a better idea of the scope of the project and the resources needed for the effort.

LEARNING OBJECTIVE ANALYSIS WORKSHEET
CNET-GEN 1550/4 (Rev. 6-81) S/N 0107LLNF04731

COURSE	UNIT/MODULE	LESSON TOPIC	TASK I.D. NUMBER	PAGE NO.
Interior Comm "A"	6	6.2	TCB-01	

Fill out one section only.		TERMINAL OBJECTIVE NO.	TEST ITEM NUMBER	ENABLING OBJECTIVE NOS. THAT SUPPORT THE TERMINAL OBJECTIVE
	[X] TERMINAL	29.0	29.0A	29.1, 29.2, 29.3, 29.4, 29.5
		ENABLING OBJECTIVE NO.	TERMINAL OBJECTIVE NO. THE ENABLING OBJECTIVE SUPPORTS	
	[ ] ENABLING			

LEARNING OBJECTIVE ACTION STATEMENT

Troubleshoot the alarm, safety and warning system

CONDITION

given an alarm switchchboard (TC/S), associated contact makers, audible alarms, and a system schematic

STANDARD

isolating single faults to the circuit and component level

LEARNING CATEGORY

Problem Solving

TEST ITEMS

29.0A Your instructor has prefaulted one or more faults into the alarm, safety, and warning system. Troubleshoot the system following the Navy 6-step troubleshooting procedures, isolating single faults to the circuit and component level. Your instructor will watch and evaluate your performance according to evaluation checklist #2-2.

MEDIA SELECTION

Video Tape - 8848DN "Navy Six-step Troubleshooting Procedures"

EQUIPMENT REQUIRED FOR PERFORMANCE OF OBJECTIVE

Alarm switchboard (TC/S)
Associated contact makers
Audible alarms
System schematic

EXISTING MATERIALS SELECTED

[X] YES [ ] NO *If YES, outline below.*

Figure II-10.--A Learning Objective Analysis Worksheet Filled in for a Terminal Objective.

LEARNING OBJECTIVE ANALYSIS WORKSHEET
CNET-GEN 1550/4 (Rev. 6-81) S/N 0107LLNF04731

COURSE	UNIT/MODULE	LESSON TOPIC	TASK I.D. NUMBER	PAGE NO.
Interior Comm "A"	6	6.2	TCB-01	

Fill out one section only.				
	[ ] TERMINAL	TERMINAL OBJECTIVE NO.	TEST ITEM NUMBER 29.5A	ENABLING OBJECTIVE NOS. THAT SUPPORT THE TERMINAL OBJECTIVE 29.0
	[X] ENABLING	ENABLING OBJECTIVE NO. 29.5	TERMINAL OBJECTIVE NO. THE ENABLING OBJECTIVE SUPPORTS	

LEARNING OBJECTIVE ACTION STATEMENT

List the sequence of steps require' isolate a fault in the alarm, safety and warning system

CONDITION

from memory, aids

STANDARD

all steps must be present and in the correct order as given in the "Navy Six-step Troubleshooting Procedure".

LEARNING CATEGORY

Recall

TEST ITEMS

29.5A The following symptoms indicate a fault in the alarm, safety and warning system. List the correct sequence of steps required to isolate the fault to the circuit and component level. All steps must be in the correct order.

MEDIA SELECTION

EQUIPMENT REQUIRED FOR PERFORMANCE OF OBJECTIVE

not required.

EXISTING MATERIALS SELECTED

[X] YES [ ] NO If YES, outline below.

Figure II-11.--A Learning Objective Analysis Worksheet Filled in for an Enabling Objective

2.1.3.3 <u>Numbering Learning Objectives.</u> Each learning objective must be numbered so that any enabling objective can be traced directly to the terminal objective which it supports. The task in the JTI from which the terminal objective or enabling objective was derived will be listed in parenthesis after the objective.

2.1.3.4 <u>List of Learning Objectives.</u> A complete list of all the learning objectives for the course will be produced as a final product of the learning analysis. This list of learning objectives will, at the option of the functional command, be submitted to the appropriate curriculum approval authority.

2.1.3.5 <u>Procedures for Evaluating Learning Objectives.</u> A learning objective may be clear (i.e., has an action verb, standard, and condition), but be inappropriate for the intent of the instructional program. In this case, the objective is INADEQUATE. To be appropriate, a learning objective must prepare the student for what he will be required to DO or KNOW following the instructional program. The follow-on duty could be anything from actual job performance, to on-the-job training, to another formal follow-on school; these are all "JOBS" after a training program. To determine appropriateness of a learning objective, always REMEMBER THE JOB. If the learning objective is clearly stated and appropriate in terms of the job, then the learning objective is ADEQUATE.

The procedures for determining objective adequacy are:

Step 1: Determine whether or not the OBJECTIVE is CORRECTLY STATED.

. Are the CONDITIONS under which student performance is expected specified?

ENVIRONMENT: PHYSICAL (weather, time of day, lighting, etc.)
SOCIAL (isolation, individual, team,

audience, etc.)
PSYCHOLOGICAL (fatigue, stress, relaxed, etc.)

INFORMATION: GIVEN INFORMATION (scenario, formula values, etc.)
CUES (signals for starting or stopping)
SPECIAL INSTRUCTIONS

RESOURCES: JOB AIDS (cards, charts, graphs, checklists, etc.)
EQUIPMENT, TOOLS
TECHNICAL MANUALS

. Are the STANDARDS which the student performance must meet specified?

PERFORMANCE: COMPLETENESS (how much of the task must be performed)
ACCURACY (how well must each task be performed)
TIME LIMIT (how much time is allowed)
RATE (how fast must task be done)

PRODUCT: COMPLETENESS (what must finished product contain)
QUALITY (what objective standard must product meet)
JUDGEMENT (what subjective opinions must product satisfy)

- Is the BEHAVIOR the student must perform specified?

- Is an action verb used to specify what the student must do?

- Is only one action stated in the objective?

Step 2: Determine whether or not the OBJECTIVE is APPROPRIATE.

. Are the CONDITIONS appropriate for the work to be performed on the job or for later training?

. Are the STANDARDS appropriate for the work to be performed on the job or for later training?

. Is the task level (i.e., will the student use or remember the information?) of the action appropriate for the work to be performed on the job or for later training?

2.1.4 Evaluating Learning Objectives. In the following sample learning objective, the evaluation process is used to determine if the learning objective is ADEQUATE.

OBJECTIVE: The student will solve for total power in a DC parallel circuit.

CORRECTLY STATED?	BEHAVIOR?	OK - ONE ACTION
	CONDITIONS?	INCOMPLETE Although the student is asked to solve for total power, there is no way to tell what circuit values he is given. The objective should specify what variables values will be given for, so that the correct power formula can be chosen.
	STANDARD?	INCOMPLETE The implied standard is 100%, but a precision (e.g., two decimal places) should be specified.
APPROPRIATE?	BEHAVIOR?	OK
	CONDITIONS?	----- The revised conditions should be appropriate for the job.
	STANDARD?	SEE ABOVE.

NOTE: There should be a previous objective requiring the student to RECALL the appropriate formula for solving for total power.

REVISED OBJECTIVE: The student will SOLVE for total power in a given DC parallel circuit, given values for any two of the following: current, voltage, or resistance. Answer will be accurate to two decimal places.

2.2 DEVELOP TEST ITEMS

In Section 2.1.1, a learning analysis was conducted to determine what the students must do and know to successfully complete the course. In this section, test items to measure the students' attainment of the learning objectives will be written.

2.2.1 Criterion-Referenced Testing

New courses and all courses that undergo a Type A or B revision must use criterion-referenced testing. In criterion-referenced testing, an individual's performance is compared to external criteria which are derived from an analysis of what is required to perform a particular job. It is important to realize that a test is criterion-referenced or norm-referenced depending on the interpretation of scores, not necessarily on the content of the test. It is often difficult, if not impossible, to determine if a test is criterion-referenced or norm-referenced just by looking at the test items. It is the interpretation and decisions made on the basis of test results that determine the type of test. Criterion-referenced means that an individual's test performance is compared--referenced--to an absolute standard or criterion concerning what a student must know or be able to do.

. The measurement for each test item is the exact standard that is specified in the objective. The test item may be identical to the task statement or there may be additional constraints in the training setting that decrease the fidelity of the test. Each learning objective (LO), both terminal and enabling (TO and EO), must be tested in the training setting. The learning steps (LS) may or may not be tested individually; however, the EO's they support are always tested.

2.2.2 Development and Use of Criterion-Referenced Testing

Test items will be developed for each terminal and enabling objective. You must follow the steps listed below. Steps 2.2.2.1 through 2.2.2.4 pertain to the actual test item development. Steps 2.2.2.5 and 2.2.2.6 refer to the administration of tests to the students and step 2.2.2.7 pertains to the use of test results to improve instruction. Although step 2.2.2.7 is used in the internal evaluation process (Section 5.1), it is included here to provide a complete picture of criterion-referenced testing and to emphasize the importance of all steps involved in the development and use of criterion-referenced testing.

2.2.2.1 <u>Review Learning Objectives.</u> The first step in developing criterion-referenced test items is a review of each learning objective to ensure the presence of a well-defined specific behavior, a condition, and a standard. Each learning objective must be revised until the behavior, condition, and standard specify exactly what the student must do (overtly). (See section 2.1.3.5 to evaluate learning objectives.)

2.2.2.2 <u>Analyze Objectives and Specify Testing Constraints.</u> The second step is an analysis of each objective and specification of testing constraints which may cause changes in learning objective conditions and standards. Examples of constraints to be considered include time availability, degree of realism in training, and degree of realism required in testing. Learning objectives will be written to describe as

much of the real world behavior, conditions and standards as can be attained in the school environment. However, it makes no sense to write learning objectives with job-related action statements and with job-related conditions and standards and then to give the student a multiple-choice test.

2.2.2.3 Write Test Items to Measure Student Achievement. The test items will always measure the exact BEHAVIOR, CONDITION(S), and STANDARD as specified in **the learning objective.**

It must be remembered that performance on a test item is an indication of whether or not the student can do the task defined by an objective. Therefore, some objectives may call for several test items. For example, take the objective: "Student will solve for total power in a D.C. parallel circuit, given values for any two of the following: current, voltage, or resistance." Several items would be needed to assure you that a student could solve such problems. The reason you are testing is to give you a basis for deciding that a student can or cannot do the task specified in the objective. That is the reason that test items must be consistent with their objectives: that is, content must match and the appropriate format be used. Each test item will be numbered so that it can easily be traced to the appropriate learning objective(s) which it measures. Figure II-12 shows an LOAW with the test item numbers entered. According to the form, these items will test terminal objective 2.0. Later, this will aid in ordering the test items to conform to the instruction.

LEARNING OBJECTIVE ANALYSIS WORKSHEET
CNET-GEN 1550/4 (Rev. 6-81) S/N 0107LLNF04731

COURSE	UNIT/MODULE	LESSON TOPIC	TASK I.D. NUMBER	PAGE NO.
Interior Comm "A"	1	1.2	none; terminal knowledge	

Fill out one section only.				
[X]	TERMINAL	TERMINAL OBJECTIVE NO. 2.0	TEST ITEM NUMBER 2.0A - 2.0E	ENABLING OBJECTIVE NOS. THAT SUPPORT THE TERMINAL OBJECTIVE 2.1, 2.2, 2.3, 2.4, 2.5
[ ]	ENABLING	ENABLING OBJECTIVE NO.	TERMINAL OBJECTIVE NO. THE ENABLING OBJECTIVE SUPPORTS	

LEARNING OBJECTIVE ACTION STATEMENT

Recall and list the general safety precautions that must be followed when working with or near electrical/electronic equipment.

CONDITION

from memory; no aids

STANDARD

all general safety precautions must be listed, paraphasing is acceptable.

LEARNING CATEGORY

Recall

TEST ITEMS

2.0A List five basic safety precautions to observe while handling electrical fires.
2.0B List three steps to follow to avoid electrical stock.
2.0C List three warning signs and tags used to warn ships personnel of electrical shock hazard areas.
2.0D List form safety precautions to be followed when working topside and near radio frequancy radiation and "Stock Gas".
2.0E List five safety precautions to observe while working on rotating equipment, power tools, and storage batteries.

MEDIA SELECTION

Five Sound/Slide Programs Covering

a. Class C fires
b. Electrical shock hazards and avoidance
c. Warning signs and tag out procedures
d. Working aloft
e. General electrical and power tool safety

EQUIPMENT REQUIRED FOR PERFORMANCE OF OBJECTIVE

none required

EXISTING MATERIALS SELECTED

[ ] YES [X] NO *If YES, outline below.*

Figure II-12. --A Learning Objective Analysis Worksheet with Test Item Numbers Entered.

2.2.2.4 Develop Pass-Fail Performance Criteria. An objective pass-fail scoring procedure should be developed. If based on the standard specified in the learning objectives, it will ensure that all students perform the task.

2.2.2.5 Define Environmental Criteria for Administration of Tests. Tests will be administered to all students under the same environmental conditions. Administrative instructions must be clearly and simply stated and must be uniformly applied. Equipment worked with or on during testing will be restored to its pretest condition if it was used by successful students. Similarly, environmental factors such as visibility, temperature, attitude of test administrator, time of day, and the like must be stabilized as much as possible.

2.2.2.6 Provide Instructions for Scorer, Student, and Administrator of Test. Details concerning test materials, equipment, procedures, precautions, etc. must be specified. Directions to the student on how to take the test must be written. The scoring procedures must also be written.

2.2.2.7 Use of Tests to Evaluate Training. After instructional materials have been developed and the students are taking the course, student performance on test items will be used to measure the students' attainment of learning objectives. Consistent failure of the students to achieve a learning objective is an indication that the instructional materials teaching the learning objective need to be revised, or that prerequisite skills for the attainment of the learning objective are needed.

2.2.3 Types of Criterion-Referenced Test Items

Every effort must be made to select a type of test item which best suits the learning objective to be measured. The following are various types of test items which may be used to measure student performance.

2.2.3.1 Performance Test Items. If a learning objective requires that students be able to focus a radar repeater or weld a joint, then, the test item will require them to focus a radar repeater or weld a joint. Practical performance test items of this type are often difficult to administer and are frequently time-consuming. When realism is impractical in the testing process, the test writer must make every effort to incorporate considerable realism into written test items. Types of performance test items easy to administer include typing, teletypewriting, shorthand, etc. Four types of performance tests are as follows:

(1) CHECKLIST TEST ITEM. The checklist type of test item is best utilized when measuring achievement of a process or operation consisting of many well defined steps which must be integrated or sequentially performed for the process to be successful. The test administrator has a list containing all of the steps or features involved and checks off each step as it is completed by the student. Many aspects of the student's peformance can be evaluated by using this type of testitem. Safety precautions, utilization of tools, equipment, facilities, etc. can be included in the checklist along with the required performance procedural steps being directly tested. The use of the checklist type test items is recommended for evaluating critical, complex, or very lengthy performance.

. Construction: Devise a checklist that contains all of the important and essential steps and factors required for successful performance. Include all steps, processes, safety precautions, utilization of tools, equipment, etc. upon which evaluation of the performance will be based.

. Example: See Figure II-13.

PROCTOR GUIDE FOR STUDENT ORIENTATION

A. Present the following to the student:

1. This is a personnel skill proficiency exam for the Missile Test and Readiness Equipment (MTRE).
2. The exam will consist of three (two) problems and you will have a limited amount of time to complete each problem.
3. Prior to the beginning of each problem, I will give you an explanation of the problem and what you are required to do. I will also give you a time limit for each problem.
4. All test equipment, tools, and materials are readily available for you, but it will be up to your discretion as to what you will need to use for the solution of each problem.
5. You will be required to leave the area after each problem so that I may prepare for the next problem.
6. You will be evaluated on your overall knowledge and your practice of safety precautions, so observe all rules. I will intervene at any time to prevent or correct the violation of a safety precaution.
7. I cannot assist you in your solution; however, I will intervene after each problem begins only if absolutely necessary for safety reasons or to correct some critical procedural error.
8. I will restate or explain the problem at any time if you request me to do so. Do the best you can for each problem. If you cannot solve the problem, tell me so and we will move on to the next problem.
9. I will have to observe you closely, but try not to let this interfere with your normal solution techniques.

B. Ensure that the student understands all of the above items before proceeding to the first problem.

Figure II-13.--Evaluation Checklist (Sheet 1 of 5).

PROCTOR GUIDE FOR PROBLEM #3

A. Preset the following controls as indicated:
   1. Disconnect MTRE from FBMWS (door 034A) (if applicable)
      a. MTRE/MSL TEST SWITCH CHAN 1 and CHAN 2 — TEST indicators are OFF
      b. MTRE/MSL TEST SWITCH CHAN 1 and CHAN 2 toggle switches to MANUAL
      c. MTRE/MSL TEST SWITCH MTRE MON — CHAN 1 and 2 indicators are OFF
      d. MTRE/MSL TEST SWITCH MTRE MON toggle switch to MANUAL
   2. Power Distribution Panel (Post 002)
      a. MTRE MK 7 AUTO/MANUAL switch to MANUAL
      b. MTRE MK 7 ON/OFF switch to ON
   3. Automatic Operations Panel
      a. LOCAL/REMOTE switch to LOCAL
      b. Press POWER OFF pushbutton
   4. Remove system verification tape cartridge from tape reader
   5. Tape reader
      a. Remove amplifier card A05 and replace with the amplifier card A05 provided.

B. Explain the following to the student:
   1. MTRE is disconnected from the FBM Weapons System. Perform the Tape Reader Electrical Checks and Adjustments (Standard Maintenance Procedure) to ensure that tape code hole 6 pulse width is within tolerance. Make any necessary adjustment. DO NOT perform the 6-volt and 12-volt d.c. power supply adjustments. Restore MTRE to normal when you finish. You may ask me to repeat the problem at any time. You have 30 minutes. Begin now.

C. Use evaluation checklist for problem #3.

Figure II-13.--Evaluation Checklist (Sheet 2 of 5).

Evaluation Checklist (Perform Tape Reader Electrical Check and Adjustment)

Student Name: ______________________ Date: __________

Rate: ______________________

Problem #3 (MTRE Mk 7 Mod 2)

Step	Step Description	Step Evaluation		Description of Error or Comment
	"Observation"	Yes	No	
1.	Used proper documentation: OP 3751, Vol. 2, Part 4, SMP 24-7010			
2.	Installed system verification tape cartridge into tape reader–did not thread tape through tape reader mechanism			
3.	Pulled two spring lifter slides (before SPALT 7664) or pinch roller spring lifter slide (after SPALT 7664) and installed special test tape with sprocket holes adjacent to front panel; pushed in two spring lifter slides (pinch roller spring lifter slide after SPALT 7664)			
4.	Installed rubber band to retain tape tension switch arm in open position			
5.	Pulled out tape reader dust cover interlock switch			
6.	Inserted extender card into tape reader test point connector J2B and connected oscilloscope ground lead to extender card test point 17			
	"Code Hole 6, Pulse Width Check"	NOTE: Instruct student to depart from SMP to cover Code Hole 6 Pulse Width ONLY		
7.	Connected oscilloscope channel A signal lead to extender card test point 6			
8.	Pressed AOP POWER ON and START TEST 9000 pushbuttons			

(Continued on next page)

Figure II-13.--Evaluation Checklist (Sheet 3 of 5).

Step	Step Description	Step Evaluation		Description of Error or Comment
	"Observation"	Yes	No	
9.*	Adjusted oscilloscope sweep rate to display 9-cm waveform a. Compared waveform with example code hole waveform (A) in SMP b. Removed tape reader rear cover by loosening quick-release fasteners c. Removed amplifier cards cap by removing attaching screws d. Adjusted R25 on amplifier card A05 until a 2:1 ratio was obtained on code hole waveform			
10.	Pressed POWER OFF pushbutton; removed test leads and extender card			
11.	Removed rubber band from tape tension switch arm; pulled two spring lifter slides (pre-SPALT 7664) or pinch roller spring lifter slide			
12.	Removed special test tape from tape reader, and threaded system verification tape thereon; pushed in two spring lifter slides (or pinch roller spring lifter slide)			
13.	Pressed POWER ON and START TEST 9000 pushbuttons and verified proper tape reader operation			
14.	Pressed POWER OFF pushbutton; reinstalled amplifier cards cap and tape reader rear cover			
15.	Restored MTRE to normal a. Positioned MTRE Mk 7 ON/OFF switch to OFF on Power Distribution Panel			

*Critical Step (Continued on next page)

Figure II-13.--Evaluation Checklist (Sheet 4 of 5).

Problem #3 (MTRE Mk 7 Mod 2) (Continued)

Step	Step Description	Step Evaluation		Description of Error or Comment
	"Observation"	Yes	No	
	b. Positioned MTRE/MSL TEST SWITCH CHAN 1 and 2, and MTRE MON toggle switches to AUTO, on door 034A c. Shut and secured MTRE doors and removed cartridge from tape reader			
16.*	Followed safety precautions; see page 2 of the guide: "SOME SAFETY PRECAUTIONS" a. B2 (Removes power) b. B4 (Connects ground) c. B5 (Interlocks) d. B7 (Uses one hand) e. B8 (Extender card) f. B10 (Handling equipment) g. B11 (Operating equipment)			
17.	Completed problem in alloted time (30 minutes)			Actual Time: ________ minutes

*Critical Step

Figure II-13.--Evaluation Checklist (Sheet 5 of 5).

(2) STUDENT RECORDED TEST ITEM. This type of test item is often used when constant observation of the student's demonstration is not required, but a record of how the student arrived at the determination/conclusion or completion is essential to evaluating the performance. The student records his or her action by writing a descriptive sentence, phrase, equation, or word on a designated form as each step or process involved is completed. The entries are evaluated by the scorer without interpretation since the student recorded exactly what he or she did. Use of the fill-in type test item is advantageous when a large number of students must be examined by a few test administrators.

. Construction: Devise a form on which a student will record information during testing. Sections of the form are to be designated for recording specific information. Entry spaces for recording information will be provided for all factors on which the performance will be evaluated.

(3) FINAL PRODUCT TEST ITEM. This type of test item is used when the process or procedure by which the student arrived at a conclusion or completion is relatively unimportant when compared to the final product or result. It has limited application in the training environment. The student will be scored only on the quantity or quality of the final product or result as compared to the standard model. Minimum scorer bias is introduced since the evaluation will be made by comparing the final product to the standard model.

. Construction:

(a) Develop a model of the final product as a standard for evaluation.

(b) Determine the dimensions or factors making up the final product that will be compared when evaluating the student's final product.

. Example: Test administrator displays a completely assembled .45 caliber pistol and the dismantled parts of another on a desk. The student is asked to assemble a finished model.

(4) COMBINED TEST ITEM. This prevalent and useful type of test item incorporates some of the best features of the three types listed above. It is used when the process, or steps, and the result are of relatively equal importance.

If the student's performance is critical, complex, or lengthy, and requires a final product of high quality, a combination of the three preceding tests may be used. In this case, it may be necessary to have a checklist for the test administrator's observance of the performance, a student fill-in to evaluate factors which are essential but not readily observable and a model response or standard final product model for comparison of the end result.

. Construction:

(a) Devise the recording checklist (if necessary).

(b) Devise the student fill-in form (if necessary).

(c) Develop the standard model.

(d) Develop an objective pass-fail scoring procedure based on the standard stated in the learning objective.

2.2.3.2 <u>Written Test Items.</u> Sometimes the learning objective requires that students perform a task that produces a written end product such as making entries in a log or filling out a form. At other times, learning objectives call for

measurement of the student's knowledge or memory of certain facts or procedural steps. In cases such as these, written test items are appropriate and shall be developed. Completion, multiple-choice, matching, true-false, cluster true-false, and labeling are six types of written test items.

(1) COMPLETION TEST ITEM. The completion test item requires the student to provide a response rather than select from a list of given responses. Usually it requires the student to supply a critical element or elements which have been omitted from a statement. Completion (short answer) type test items are not normally direct input to the computer in a CMI course. Rather, the student converts his or her answers to a machine-readable format through the use of an alternative sheet upon completion of the test.

. Construction

(a) Use only one blank per sentence.

(b) Put the blank at or near the end of the statement and represent the element to be supplied by a blank of uniform length.

(c) Use only one correct response for each blank.

Ensure that there is no acceptable substitute for the correct response.

(d) Ensure that the missing item is important, such as the key element of a piece of equipment.

. Examples:

1. A pilot can determine compass heading by correcting for variation and ----------.

To aid in dissipating heat, the nose cone of a reentry vehicle is coated with ----------.

(2) MULTIPLE-CHOICE TEST ITEM. This type of test is used primarily to determine the student's ability to recognize facts and principles specified in the learning objectives of the course. A multiple choice test is usually employed in evaluating the student's acquisition of knowledge.

. Construction:

(a) Determine the behavior called for in the learning objective which the item is to test.

(b) Devise a problem or question which requires the student to perform the behavior called for.

(c) Develop four equally realistic alternative solutions to the problem or answers to the question. Three choices may be used if there are only three plausible answers.

(d) Evaluate alternatives to ensure that only one is correct and indisputable.

(e) Format the problem or question and alternatives or choices in a manner such that the correct choices will not be revealed to the student by the arrangement of choices or the grammar used.

(f) Include in the item all conditions, information, assumptions, and details required to correctly answer the question.

(g) Use language used by students and used on the job.

(h) Use sketches, diagrams, etc. when they present situations better than words.

(i) Place correct answers in random positions throughout the test items.

(j) List numerical choices in order of magnitude.

DO NOT:

(a) Use the articles "a" and "an" at the end of the item; this tends to indicate the correct choice.

(b) Use negative terms.

(c) Use catch questions, unimportant details, or ambiguous phrases or questions.

(d) Use choices such as "all of the above" or "none of the above."

(e) Use more than one correct answer or response.

. Examples:

1. Which statement describes the operation of a magnetron?

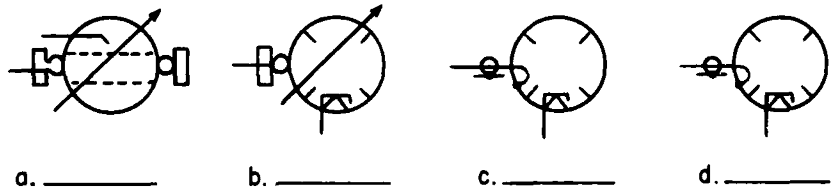
a. The desired mode of operation is one in which there is a 90-degree difference between the anode segments.

b. Magnetrons can oscillate in several different modes, depending on the number of anode cavities.

c. If the mode of operation changes in the magnetron, the frequency remains the same.

d. Electrons emitted by the cathode are put into a cycloidal path by the AC field; they bunch into groups and release their energy to the AC field of each cavity.

2. Which symbol represents a magnetron equipped with a permanent magnet?



(3) MATCHING TEST ITEM. This type of test item is used to measure a student's ability to recognize, associate, and discriminate among things similar or related. Alternate forms may require the student to match responses to symbols or numbers or parts of an accompanying illustration.

Example:

Complete the blank spaces on the illustration below, using the correct letter from the list of terms that follow:

(a) AC FIELD

(b) PERMANENT MAGNETIC FIELD

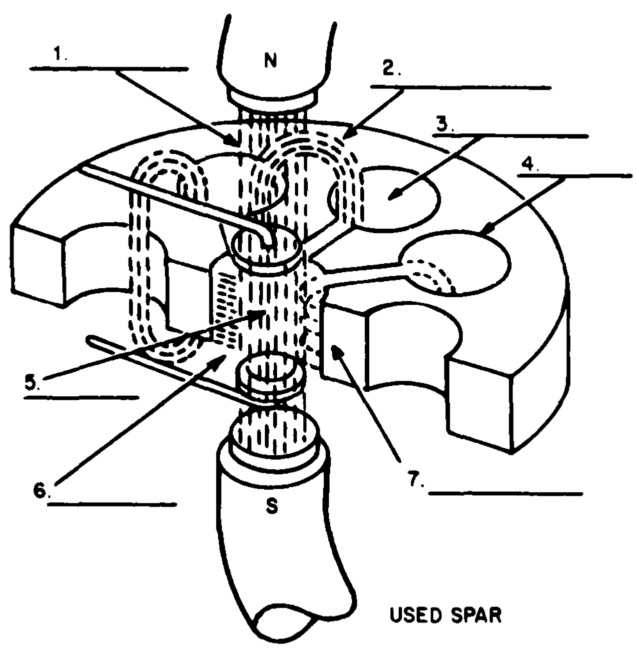
(c) DC FIELD

(d) OSCILLATING CAVITY MAGNETIC FIELD

(e) ANODE

(f) CATHODE

(g) OSCILLATING CAVITY



(4) TRUE-FALSE TEST ITEM. This type of test item should be used sparingly since the chance factor is great.

. Construction:

(a) Include only one idea in each statement.

(b) Place the crucial element at or near the end of the statement.

(c) Do NOT use negatives as they tend to confuse the reader.

(d) Do NOT use absolutes such as "all," "every," "none," and "never."

(e) Do NOT use statements containing "some," "any," and "generally."

. Examples:

1. T ----- F ----- Solder with a tin-to-lead ratio of 60:40 goes from the liquid to solid state very quickly.

2. T ----- F ----- When cleaning solvents are being used, it is extremely important to provide adequate ventilation.

3. T ----- F ----- A good mechanical connection helps to ensure a good electrical connection.

(5) CLUSTER TRUE-FALSE TEST ITEM. True-false questions are very adaptable to troubleshooting situations where more than one component can cause the problem. This type of test item asks the student to use logic in identifying which of the associated components could or could not cause the stated problem.

. Example:

During a normal startup, the simulated engine fires; then, the rpm immediately drops to zero. Using the diagram furnished by the instructor, circle T if the listed trouble could cause the symptoms described; circle F if the listed trouble could NOT cause the symptoms described.

(a) T F The OUT-OF-FUEL relay, K7, is not energizing.

(b) T F The MASTER-ON relay, K-6, has an open pin 6.

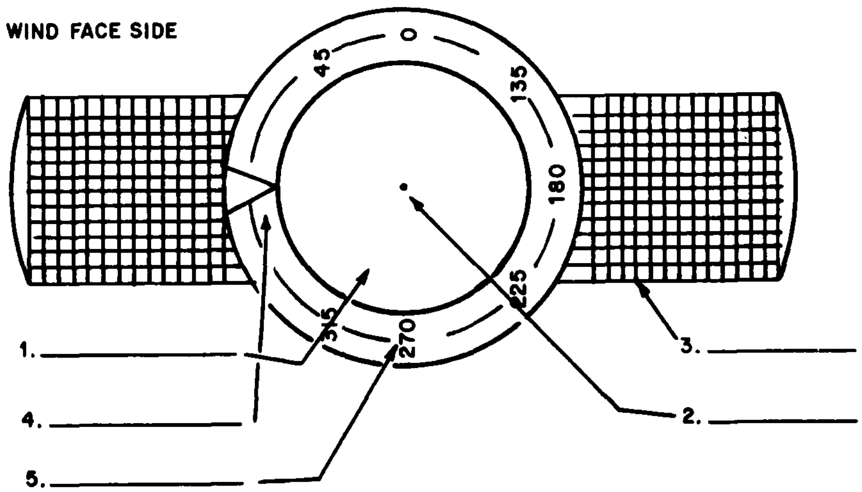
(c) T F The FUEL VALVE OPEN relay, K10, is hung energized.

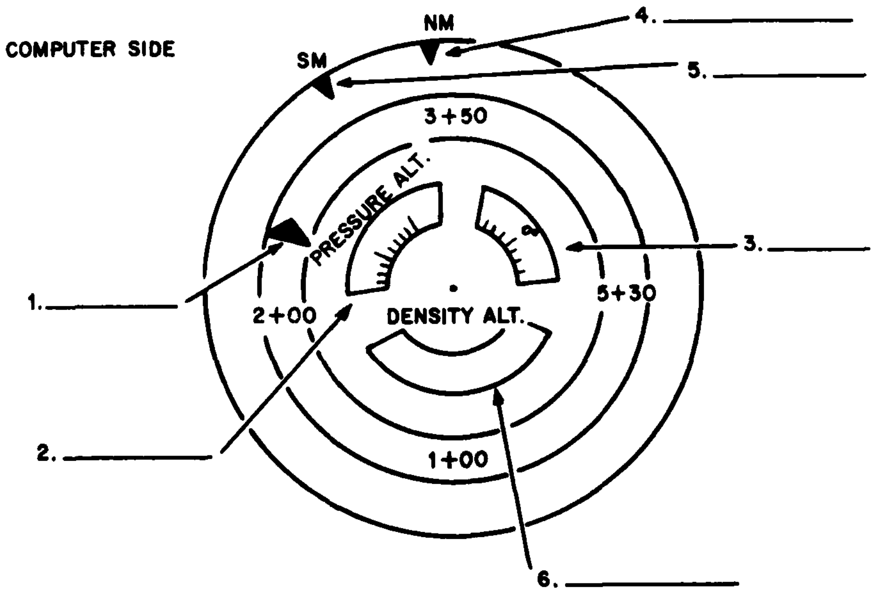
(d) T F The ENGINE FLAME relay, K12, has an open pin 4.

(6) LABELING TEST ITEMS. Labeling test items are constructed by using drawings of items which the student will identify in blank spaces provided.

- Example:

  Identify numbered parts of CPU-26 computer.





2.2.4. Test Development

The test items above, written for the learning ojbectives developed in Section 2.1, form a pool of test items. The test-item pool is the source of all test items for pretests, progress tests, comprehensive within-course tests, and final comprehensive tests. The grouping of test items into pretests, progress tests, comprehensive within-course tests, and final comprehensive tests will be done after the course has been sequenced into a unit/module lesson topic format in Section 2.4.

2.2.4.1 The Pretest. This type of test may be administered to determine the appropriate placement of an individual in an instructional program. It is also useful in determining how much of the content of a course the students entering the course already know. During validation, the scores made on the pretest are compared with scores made on later progress tests to ascertain the effectiveness of the instructional materials and to evaluate test items themselves. Pretests should be developed and administered in all individualized courses which provide for student acceleration.

2.2.4.2 The Progress Test. Progress tests are administered at intervals during a course to assess instructional effectiveness and student learning. The determination of which learning objectives will be tested in each unit/module or lesson topic is made in later sections when the curriculum outline is developed. After each student takes a progress test, the instructor will provide correct feedback for any errors. Clarifying examples similar to those on the test should be added to ensure that the student understands how the test item should have been answered.

2.2.4.3. Post Tests. Post tests are administered after the completion of instruction to assess whether a student has mastered the objectives of the course or unit. Both pretests and post tests are made up of test items drawn from the test pool. The difference, if any, lies in the purpose and use of the test and not in its composition.

2.2.4.4. Comprehensive Within-Course Test. Comprehensive within-course tests are designed to measure direct achievement of specified terminal and major enabling objectives. They are administered at selected intervals to measure the student's retention of several modules or units of instruction. Feedback will be provided to the student for each comprehensive within-course test.

2.2.4.5 Final Comprehensive Test. Final comprehensive tests are administered to determine whether the terminal objectives have been attained and are still retained at the completion of instruction.

2.2.5 Test Consistency and Adequacy

The test items will always measure the exact BEHAVIOR, CONDITION(S), and STANDARD as specified in the learning objective.

IN NO INSTANCE WILL A TEST ITEM DEVIATE from the learning objective.

At this point the objectives have been checked for correct behavior, condition and standard (ADEQUACY) and revised if necessary.

In every instructional program, each test item will be "referenced" to a specific objective. Since each objective is a statement of a "criterion" for student performance, tests for the objectives are called "criterion-referenced" tests.

A test item is "referenced" to an objective (criterion) when it is CONSISTENT with the objective. Consistency means that the behavior, conditions, and standards in the objective MUST be maintained in the testing situation. Also, the task/content of the test item must match the task/content of the objective. Finally, the FORMAT of the test item must be appropriate for (match) the task/content of the objective.

It is imperative that the test items are CONSISTENT with the learning objectives and are ADEQUATE. Consistency means that the behaviors, conditions, and standards in the learning objective must be maintained in the testing situation.

Some examples follow:

OBJECTIVE: SOLVE for total power in a given DC parallel circuit, given values for any two of the following: CURRENT, VOLTAGE, or RESISTANCE. The answer will be accurate to two decimal places.

TEST ITEM: In the circuit below, the current and voltage are given. Calculate for total power.

CONSISTENT?	Answer these questions:	
	BEHAVIORS MATCH?	YES
	CONDITIONS MATCH?	YES
	STANDARDS MATCH?	YES
ADEQUATE?	Answer these questions:	
	UNAMBIGUOUS?	YES
	WELL CONSTRUCTED?	YES
	FREE OF HINTS?	YES

OBJECTIVE: DESCRIBE, by filling in the blanks, the radar signal parameter measurement characteristics of SPS and PRF that are used in identifying circular, sector, conical, and steady types of scans on an analysis scope and by listening to audio output.

TEST ITEM: Using your scope and audio output, identify the following signals according to circular, sector, conical, or steady types of scans.

CONSISTENT? Answer these questions:
BEHAVIORS MATCH? NO
(The task/content level of the objective require remembering while the test item deals with using a scope.)

CONDITIONS MATCH? NO
(The objective calls for a paper and pencil answer. However, the student is given a radar signal and equipment.)

STANDARDS MATCH? NO

ADEQUATE? Answer these questions:
CLEAR?
UNAMBIGUOUS?
WELL CONSTRUCTED?
FREE OF HINTS?

. If a test item is not CONSISTENT it must be rewritten before adequacy can be determined.

REVISED TEST ITEM: Describe, by filling in the blanks, the radar signal parameter measurement characteristics of each type of scan: circular, sector, conical, and steady.

OBJECTIVE: The student will LIST the sequence of steps for setting up and connecting a Simpson 260P multimeter to test a transistor's
4 resistance.

TEST ITEM: List the sequence of steps for setting up and connecting a Simpson 260P multimeter to test the resistance of a transistor.

CONSISTENT?	Answer these questions:	
	BEHAVIORS MATCH?	YES
	CONDITIONS MATCH?	YES
	STANDARDS MATCH?	YES

ADEQUATE?	Answer these questions:	
	CLEAR?	YES
	UNAMBIGUOUS?	YES
	WELL CONSTRUCTED?	YES
	FREE OF HINTS?	YES

OBJECTIVE: WRITE the Ohm's Law formula (-----) for calculating for total current in a circuit.

TEST ITEM: Choose, by circling, the correct Ohm's Law Formula.

a. -----
b. R = IE
c. -----
d. None of the above.

CONSISTENT? Answer these questions:
BEHAVIORS MATCH? NO
The student is asked to remember a rule (formula) but the behaviors do not match. The objective asks the student to "write" while the action for the test item is "choose." The REASON the objective requires RECALL is because the job does. On the job, the student will probably never have to pick one from a list. He must remember it without prompts. Multiple choice formats are never appropriate for testing if a rule has

been memorized.
CONDITIONS MATCH? NO
The objective asks the student to write the formula; he is given no help. The test item gives the student several rules; one of which is right.

STANDARDS MATCH? YES

ADEQUATE? Answer these questions:
CLEAR?
UNAMBIGUOUS?
WELL CONSTRUCTED?
FREE OF HINTS?

The item is also not well constructed because multiple-choice items should not include alternatives like "none of the above."

2.3 MEASURE STUDENT ENTRY LEVEL

The purpose of this section is to accurately measure the entry level of students. Entry level behavior includes the skills, information, and attitudes students possess at the time they report for instruction. The assumptions made in Section 2.1 concerning the level of knowledge and skills possessed by students will be verified or adjusted according to the results from testing entry skills. One goal of measuring exact student entry level is to ensure effective instruction which is based on new learning in order to avoid having students waste time on practicing skills already mastered.

2.3.1 Assessing Test Results

The test items developed in Section 2.2. will be administered to a representative sample of the student population to measure student entry level behavior. Two questions must be answered: (1) How much of what will be taught in the course do the students already know? and (2) How large a gap exists between what the students know and what the course will teach them? It is anticipated that student entry level behavior will be at the lower-level knowledge and skills areas described during the learning analysis process in Section 2.1. The enabling objectives at the bottom of the learning hierarchy charts, which identify simpler tasks and information required, are those on which the students should be tested. It should not be necessary to test them on all the test items. The pretest, which was developed in Section 2.2, consists of lower-level enabling objective test items and will be used to measure students' entry level.

The test results obtained from this sample will show areas in which the prerequisite skills and knowledge have already been mastered, areas in which students lack needed skills, knowledge required to begin the course, and whether the assumptions made in Section 2.1. are true. After this has been determined, the following procedures are in order:

2.3.1.1 If Test Items are Mastered by Student. Whenever the tests show that some of the enabling objectives upon which the test items are based have already been mastered by the students, then those enabling objectives should be eliminated from the course. Elimination of skills already attained by the students will shorten the course and, consequently, save time and money.

2.3.1.2 If Students Do Not Meet Minimum Prerequisites. Whenever the tests indicate that students do not possess the minimum prerequisite knowledge and skills, the learning analysis must be extended to a lower level. New enabling objectives and test items must be developed to cover the gap between the entry level assumptions

made in Section 2.1 and the true entry level required for the course. Readminister the tests whenever new enabling objectives and test items for each objective have been added.

2.3.1.3 <u>If Test Items Adequately Measure Students' Entry Level.</u> If the test items accurately measure the students' entry level, it is unnecessary to modify existing enabling objectives and test items.

2.3.2 Establishing a Beginning Level of Instruction.

Test results for each test item will probably show that some students already know the material while others do not. The precentages will vary from test item to test item, but it is very unlikely that everyone tested will either know all of the materials or not know it. In establishing an entry level, curriculum developers must use their best judgment in determining the exact level of instruction at which to begin the course. Two factors have to be taken into consideration:

2.3.2.1 <u>Course Entry Level Too Basic.</u> If the learning analysis is so basic that the student entering the course has mastered all course prerequisites, then certain students will be too advanced for the initial stage of the course. For individualized courses, this would not be a problem, since students who already know the subject matter could quickly move ahead to more difficult material on their own initiative. However, in group-paced courses, especially those without special accelerated programs, valuable time will be lost if elementary material must be covered at the beginning of the course.

2.3.2.2 <u>Course Entry Level Too Advanced.</u> If insufficient background information is given, or if the course starts out at too difficult a level for some of the students, a high attrition rate is to be expected.

2.4 DETERMINE SEQUENCE AND STRUCTURE OF LEARNING OBJECTIVES

The last few sections described the identification of tasks to be trained and the development of objectives and test items. The objectives must now be sequenced; that is, arranged in the way the instruction will be presented to the student.

The purpose of sequencing learning objectives is to help assure that when instructional materials are developed, each objective is placed in optimum relationship to other objectives. Proper sequencing will help produce the most learning in the shortest period of time, will help the student make the transition from one skill or body of knowledge to another, and will assure that the supporting knowledge and skills are acquired before dependent subject matter is introduced. The best sequence is the one that works best for the student.

2.4.1 Determine the Relationship Between Objectives

In order to sequence two learning objectives, the relationship between them must be determined. Two learning objectives may have:

1. A dependent relationship, in that mastery of one requires prior mastery of the other;

2. An independent relationship, in that they are totally unrelated and independent of each other; or

3. A supportive relationship, in that some transfer of learning takes place from one learning objective to the other.

Figure II-14 contrasts these relationships, gives examples of each, and shows how the relationship affects sequencing.

TYPES OF RELATIONSHIPS BETWEEN LEARNING OBJECTIVES		
DEPENDENT	INDEPENDENT	SUPPORTIVE
Skills and knowledge in one learning objective are closely related to those in the other learning objective.	Skills and knowledge in one learning objective are unrelated to those in the other learning objective.	Skills and knowledge in one learning objective have some relationship to those in the other learning objective.
To master one of the learning objectives, it is first necessary to master the other.	Mastering one of the learning objectives does not simplify mastering the other.	The learning involved in mastery of one learning objective transfers to the other, making learning involved in the master of the other easier.
EXAMPLES: In math, in order to learn multiplication one must first learn addition. One cannot send messages in Morse Code without first having mastered the codes for each of the letters and numbers. The "sending" skills are totally dependent on the prior learning.	EXAMPLES: For a yeoman, "type letters from drafts" is independent of "maintain files." For a Fire Control Technician, "operate the UN/USM 281 Oscilloscope" is independent of "isolate the malfunction in a representative F.C. Digital Computer and I/O device. In both examples, knowing how to do one would not help much with the other.	EXAMPLES: "Assemble weapon" has a supportive relationship to "disassemble weapon." "Operate a Mamiya TLR camera" has a supportive relationship to "operate a 4 x 5 Press camera." In both examples, learning to do one would help considerably in learning to do the other.
The learning objectives must be arranged in the sequence indicated by the above hierarchy.	In general, the learning objectives can be arranged in any sequence without loss of learning.	The learning objectives should be placed close together in the sequence to permit optimum transfer of learning from one learning objective to the other.

Figure II-14.--Types of Relationships Between Learning Objectives.

The figure might give the impression that all pairs of learning objectives that do not have a dependent relationship have either a completely independent or completely supportive relationship. But, most pairs of learning objectives that do not have a dependent relationship probably fall somewhere between these two extreme positions. Between most pairs of learning objectives, some transfer of learning may take place. This makes for some difficulty in sequencing these learning objectives. If you are convinced that very little or no transfer of learning is likely to take place between two learning objectives, consider the relationship an independent one. When in doubt, consider the relationship a supportive one. Guidelines for sequencing learning objectives with independent and supportive relationships will be presented later in this section.

2.4.1.1 <u>Sequence Learning Objectives with Dependent Relationships.</u>

It is usually a simple step to sequence learning objectives with dependent relationships, particularly when the learning objectives were arranged in the proper hierarchy.

For example, a terminal objective with its supporting learning objectives and learning steps might look like Figure II-15. You will note that for convenience, only the action components of the objective are listed. Before you can master the terminal objective of "get from point A to point B," you must be able to do two learning objectives: "orient map and compass," and "hike with a pack." Some of the learning objectives under "orient map and compass" have dependent relationships. These hierarchically-ordered learning objectives are, therefore, easy to sequence. One sequence is:

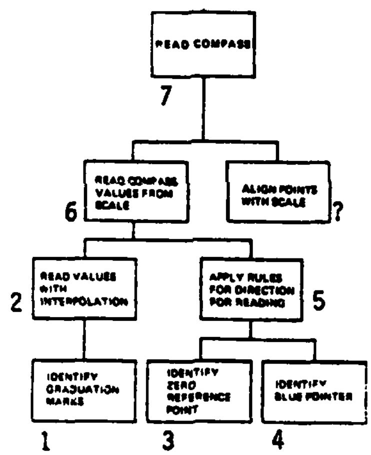
1. Identify symbols

2. a. Match symbols to actual terrain
   b. Match symbols to legend

3. a. Use legend
   b. Use grid system

4. Interpret map

Some of the learning objectives present more of a sequencing problem, however. For example, in Figure II-15, which should be placed first, "read compass values from scale" or "align points with scale"? These can be placed in either order, so long as they are both placed before "read compass," and as long as "read compass from scale" comes after the five learning objectives under it.



However, if you place "align points with scale" within learning objective 1 through 6, you would interfere with the dependent sequence of those learning objectives. Therefore, unless you have a good reason for doing otherwise, you would place "align points" either after "read compass values from scale" or before the group of learning objectives that have a dependent relationship to "read compass values from scale."

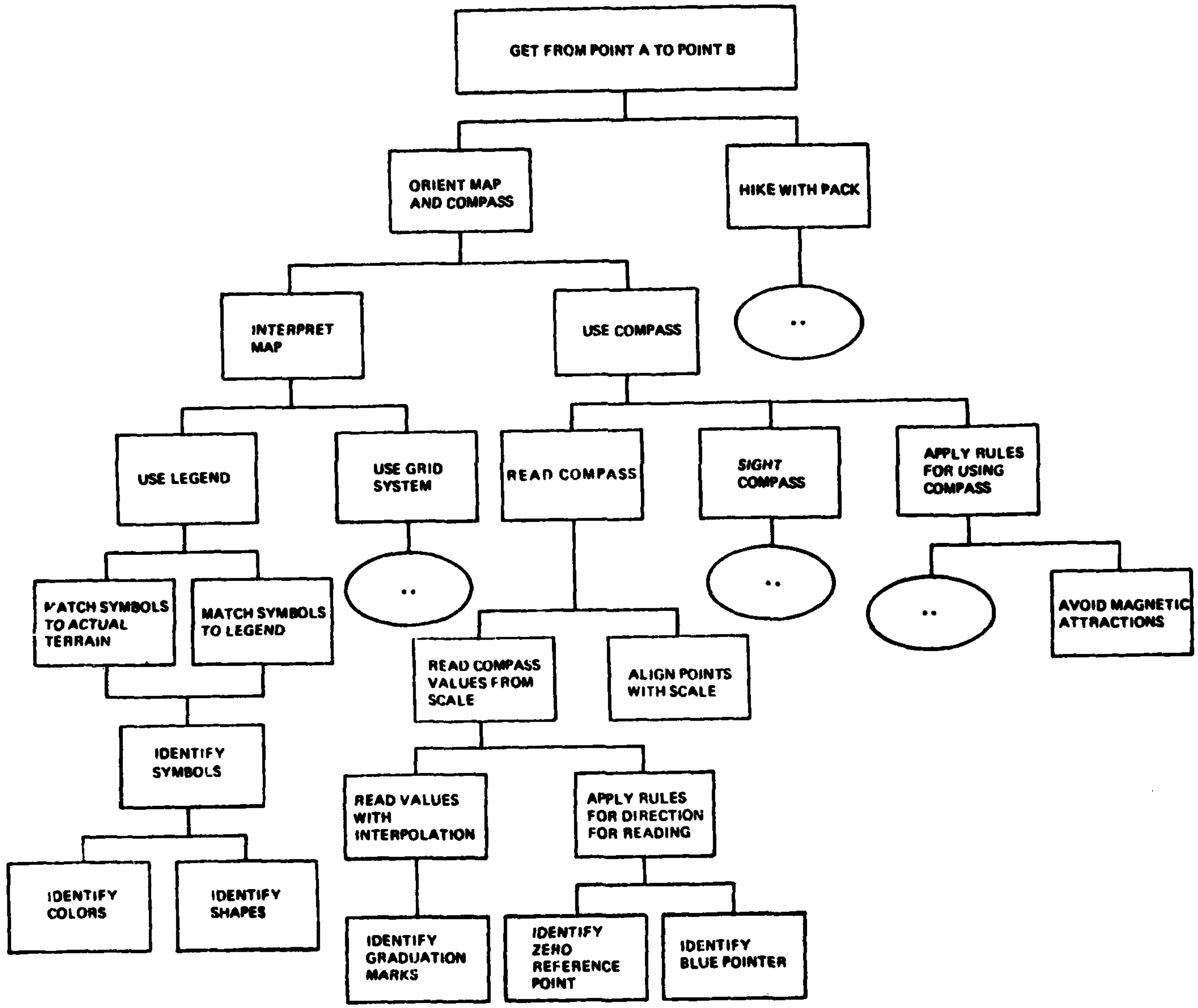
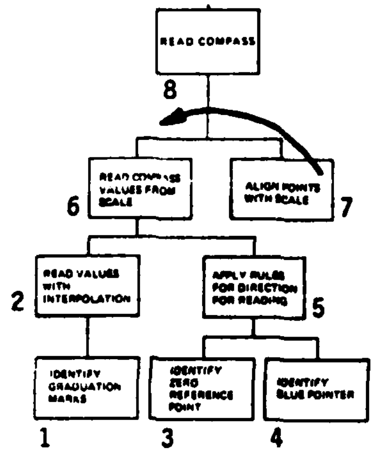
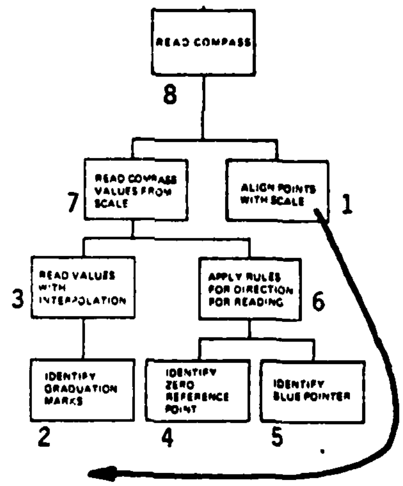


Figure II-15.--Learning Analysis



OR



There are other independent relationships in Figure II-15, For example, "sight compass" has a dependent relationship with "use compass." But, since it has an independent relationship with the other learning objectives, "sight compass" can be placed anywhere in the sequence so long as it precedes "orient map and compass." Again, as with "align points with scale," unless you had a good

reason for doing otherwise, you would avoid placing "sight compass" within a group of learning objectives that have dependent relationships with each other.

While the above are examples of learning objectives with dependent relationships that support a terminal objective, the same rules apply to sequencing terminal objectives. For example, one terminal objective might be to operate a certain piece of equipment, while another terminal objective might be to instruct others in the proper operation of the equipment. Most likely a dependent relationship exists between these two terminal objectives; therefore, you would place "operate equipment" before "instruct others."

Generally, when you place a particular terminal objective in a certain position in the sequence, you will locate the learning objectives that support the terminal objective with it. This is because of the dependent relationship of the learning objective to the terminal objective, and because of the transfer of learning that is more likely to occur when closely related learning objectives are kept together.

2.4.1.2 Sequence Learning Objectives with Supportive Relationships. The one basic rule for sequencing learning objectives with supportive relationships is to place the learning objectives as close together in the sequence as practical so that optimum transfer of learning can take place.

In addition to this basic rule, there are several other good reasons for placing learning objectives close together in the sequence. You may wish to place learning objectives close together if the conditions under which the learning objectives are carried out are identical, or similar, and if the conditions are difficult or expensive to produce at random times. For example, if several learning objectives have conditions such as "at night," "on muddy terrain," or "when flying at an altitude of 20,000 feet," you will probably wish to place the "at night" learning objectives together, the "on muddy terrain" learning objectives together, etc.

Also, if a particular piece of equipment must be available in order to accomplish a group of learning objectives, and if you are not likely to have continuous access to that equipment, you will probably wish to group the learning objectives that use that particular equipment. In addition, you will want to keep the order of the group of learning objectives within the total program as flexible as possible. For example, if the learning objective is "perform maintenance on helicopter," you will have to wait until the helicopter is available for maintenance before you can accomplish the objective.

While the effectiveness of various sequencing techniques is still under question, a number of conclusions have been reached about sequencing in general:

1. Sequencing effects are long-range. The advantages or disadvantages of using any sequencing scheme will not likely show up immediately. Therefore, end-of-course tests should be used for evaluating effectiveness of sequencing techniques. Within-course tests of small portions of the course are not likely to reveal the true effects of sequence.

2. Sequence is important to low-aptitude students. Students who have a high aptitude for the subject matter will learn it in spite of sequencing. The lower aptitude of the learner for the content, the more important it becomes that SOME type of sequence and structure is provided.

3. Sequence is important with unfamiliar materials. Students who are familiar with materials will learn regardless of order of presentation. But as material becomes increasingly unfamiliar to the student, the importance of sequence increases.

4. Sequence is important to non-redundant materials. Some instructional materials are especially redundant, stating important points over and over again. Sequencing is not especially important with these materials, because the

student can pick up the second time anything he has missed the first time. But if materials are not redundant and state their points only once, it is important that the materials be sequenced according to some rationale.

2.4.1.3 Sequence Learning Objectives With Independent Relationships. As was mentioned earlier, learning objectives with independent relationships may be arranged in any sequence; however, such learning objectives generally will not be placed between learning objectives that have a dependent relationship to each other. Any of the guidelines listed for sequencing learning with a supportive relationship may also be used for sequencing objectives with independent relationships. However, with the latter, you need not be concerned about locating the learning objectives close together in the sequence unless condition or equipment constraints indicate otherwise.

2.4.1.4 Sequence Common-Factor Learning Objectives. Common-factor learning objectives are learning objectives that are identical or learning objectives that have identical action words (Figure II-16) and similar objects of the action in the learning objective statement (Figure II-17).

In Figure II-16, consider the learning objective "desolder." It occurs under both "remove defective capacitor" and "remove transformer." But you will want to teach desoldering only one time. Therefore, you have two choices. You can delete the learning objective in all cases except the first time it appears in your list of sequenced objectives. Or, since desoldering is a prerequisite to a number of other objectives, you can delete it from every place it appears and teach it (probably along with soldering, if soldering is required in the course) near beginning of the course.

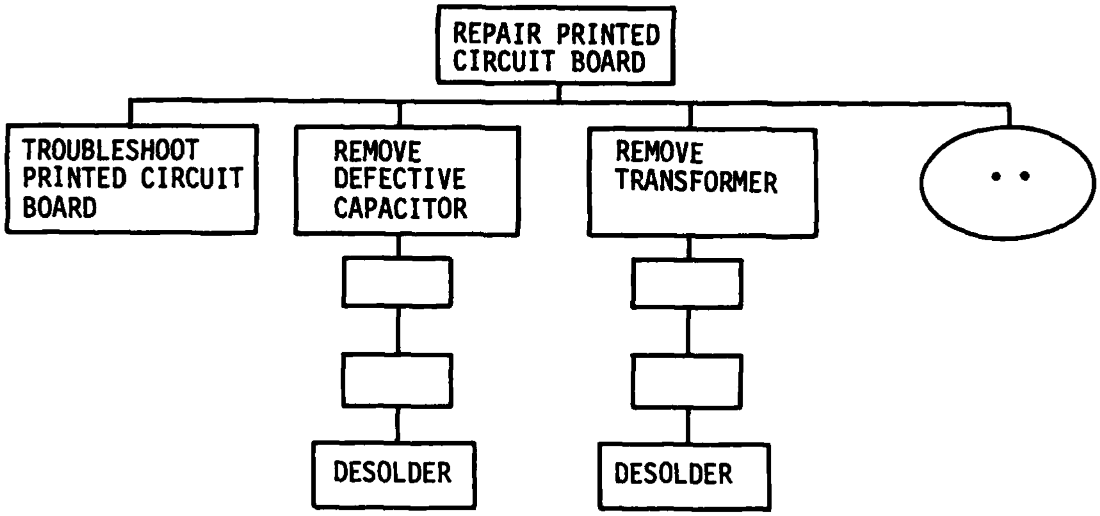


Figure II-16.--Example of Partial Learning Analysis Showing Common Element Learning Objectives.

In Figure II-17, note that "identify capacitors," "identify transistors," and "identify resistors" are required at different points. One logical way to handle these common factor learning objectives is to group all "identify" learning objectives and place them near the beginning of the course.

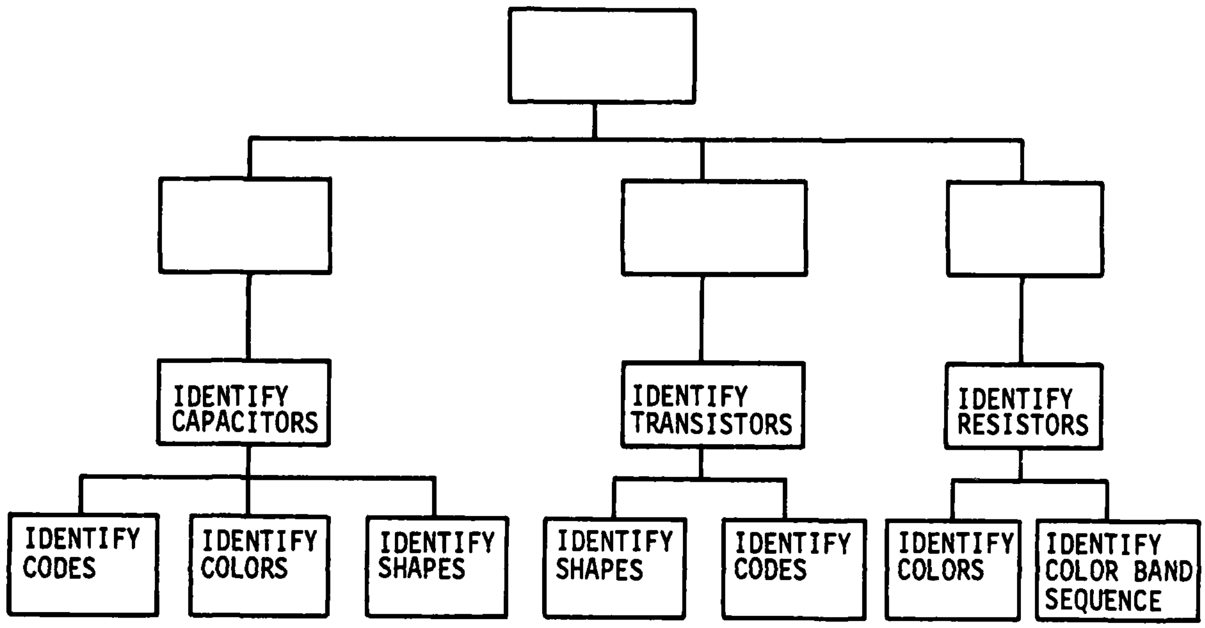


Figure II-17.--Example of Partial Learning Analysis Showing Similar Learning Objectives.

While common-element learning objectives generally should be listed early in the sequence because they represent information or skills basic to many learning objectives, the delay between introducing such objectives and the actual application of the objectives should be minimized. This is so that material learned at the beginning of training will not be forgotten by the time it is practiced as a part of other learning objectives.

2.4.2 Structure Learning Objectives into Groups

While sequencing learning objectives, you undoubtedly realized that you were dealing with quite a few items; so many, in fact, that you might have had difficulty in getting a clear picture of the relationship between all of them. You can partially overcome this difficulty by dividing the learning objectives into large groups that will provide organized, manageable blocks of content with which you can work. How many learning objectives you group into a block is an arbitrary matter. At this point, you are simply identifying learning objectives that can be grouped because of the close relationship between the learning objectives involved. Grouping can help you in the following ways:

- Grouping content areas early will help you get a clearer picture of the scope and nature of your developing program.

- Grouped learning objectives can be worked on independently. If one person is responsible for development of the total system, he can work on later groups if all the material is not available for earlier groups.

- When more than one person is assigned to develop course materials, different people can be assigned responsibility for different groups. Each person then can work relatively independently on a group of learning objectives, conferring with others as needed.

Following are some guidelines that should be helpful in dividing the learning objectives into groups:

- For a particular group, select learning objectives that bear a close relationship to each other Combined, they should make a self-contained group.

. Combine learning objectives so that the group has a natural beginning and ending point.

. Be sure all learning objectives are included somewhere.

. In general, learning objectives within your groups will remain in exactly the same order as your original sequence. However, since dividing learning objectives into groups should help clarify your total program, do not hesitate to re-sequence objectives where necessary.

. Do not assume that your group of learning objectives is unalterable. Subsequent decisions may require you to reevaluate what should constitute a group.

Once learning objectives have been sequenced, it is appropriate to identify lesson topics and units of instruction.

PHASE III

DEVELOP

3.0 INTRODUCTION

The purpose of this phase is to specify or develop the learning activities that will be used by students to acquire the required skills. Learning activities can be classified into two broad categories--knowledge and performance. This will aid you in identifying learning strategies necessary for optimum learning to take place. Curriculum Outlines and Instructional Management Plans are developed to allocate and manage all resources for conducting instruction. Instructional materials are selected or developed and tried out. When materials and the course have been validated on the basis of empirical data, the course is ready for implementation.

OPNAVINST 5100.8E requires that safety, occupational health and hazard awareness information be incorporated into the curricula of all appropriate training courses. Thus, to ensure adequacy of coverage in these areas, all appropriate course materials in the prevalidation stage of development are to be forwarded to COMNAVSAFECEN and CHBUMED for review. Instructional materials dealing specifically with occupational safety and health and hazard awareness and other units deemed appropriate by the curriculum developer should be submitted for review.

Required Documentation: Curriculum Outline, Instructional Management Plan, validation plan, validation report, instructional materials, and criterion-referenced tests.

3.1 CATEGORIZE OBJECTIVES AND SPECIFY LEARNING STRATEGIES

The following paragraphs describe the reasons for categorizing learning objectives and explain how to categorize them. Methods of identifiying the appropriate course delivery system are also discussed.

3.1.1 Why Categorize (Classify)?

The three major purposes for categorizing learning objectives are: (1) to help determine the most effective learning strategy for a given objective or set of objectives, (2) to help review for adequacy existing instructional materials which may be included in a course, and (3) to help determine the most efficient delivery system to use in a course -- group-paced or self-paced. Each of these is discussed in the following paragraphs.

. Categorizing Learning Objectives to Determine the Best Learning Strategy. The teaching techniques necessary to produce maximally effective instruction vary with the content of the objective. In other words, different categories of objectives are taught in different ways. For example, the best method for teaching the "remembering" of information, such as resistor color codes, is completely different from the best method for teaching how to "perform" a task, such as identification of hostile radar transmissions.

. Categorizing to Review Existing Instructional Materials for Adequacy. Section 3.3 shows how to locate instructional materials used in other Navy, Army, Air Force, other government agencies, or civilian courses which may be adequate for use in the course being developed. This, of course, will save much money and hours of development time. However, before a decision is made to use such materials, they must be evaluated to determine if the lesson materials are using the most effective learning strategy.

. Categorizing to Determine the Best Delivery System, Group-Paced or Self-Paced. Many

learning objectives do not readily lend themselves to self-paced instruction, while for others, self-paced is the most efficient delivery system. For example, if a course contains many performance objectives requiring team training or attitude objectives requiring group discussions, self-paced instruction may be the wrong delivery system. If the course teaches basic knowledges and skills, such as remembering facts and individually performed tasks, self-paced instruction is probably the most efficient delivery system. However, before an intelligent decision can be made regarding the best delivery system, a determination must be made on how the information contained in the objective can best be presented to the student.

3.1.2 Major Categories of Learning Objectives

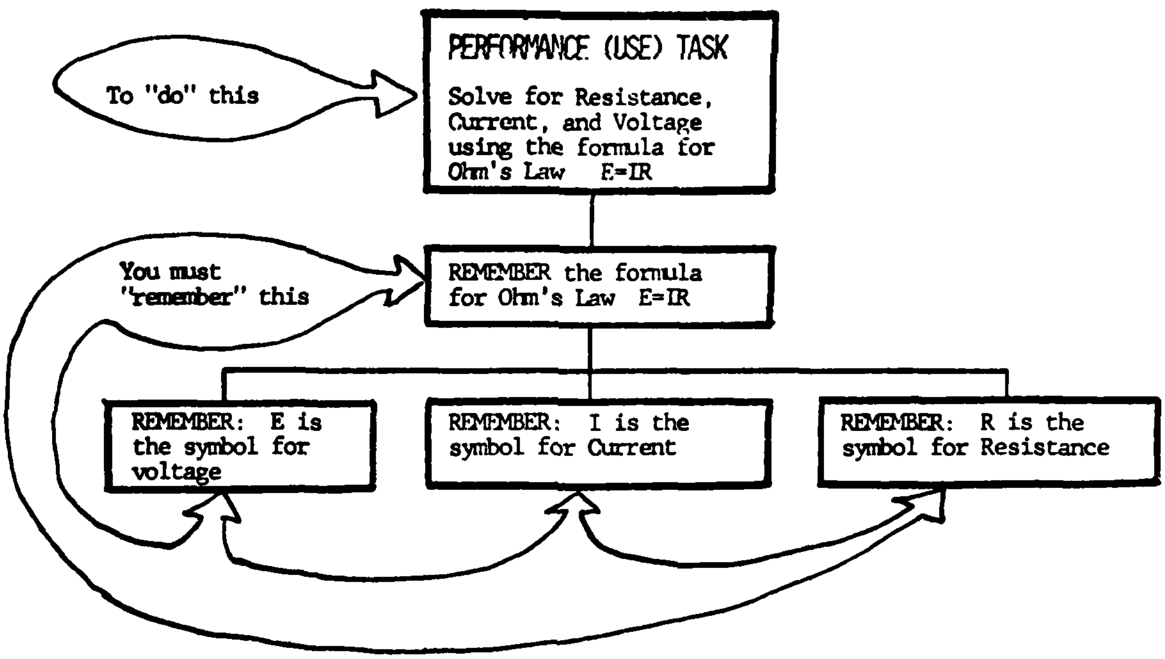
Almost all learning objectives in Naval Education and Training courses will fit into two major categories. These are KNOWLEDGE (Remember) objectives and PERFORMANCE (Use) objectives.

- KNOWLEDGE OBJECTIVES. Knowledge objectives require students to "recall" or "recognize" previously encountered information, but not apply it directly. They involve the learning of names, symbols, equipment nomenclature, or large bodies of knowledge which are necessary to support the Performance (Use) objectives which appear later in the course, in a follow-on course, or on-the-job.

  NOTE: A common and costly error is to include "unnecessary" knowledge in Navy courses. Knowledge can be costly if it increases course length without increasing job proficiency. The ISD process requires that training be geared to performance rather than to verbal knowledge and general theory. Normally, knowledge objectives are included in a course only when they support a later performance objective. There is no point teaching someone to recall or

recognize something if it is not a prerequisite to do the job.

. PERFORMANCE OBJECTIVES. These are higher level, more complex levels of learning which require students to "use" what they have learned to solve problems, classify objects, operate, or troubleshoot equipment. The emphasis is on "doing" instead of just "recognizing" or "recalling." An important point is that a student's ability to "recognize" or "recall" knowledge is usually a prerequisite to performance objectives. The diagram below should help clarify this concept.



. Additional examples of knowledge and performance objectives are provided in the chart below:

KNOWLEDGE OBJECTIVES	PERFORMANCE OBJECTIVES
1. List the characteristics which make a chemical compound an aldehyde.	1. Determine and record whether a chemical is an aldehyde when given the formula of a chemical compound.
2. Label the four control buttons on a cassette player when given a diagram of the cassette player.	2. Insert a tape in a four-button player and start the tape playing forward within one minute.
3. Write in the correct order the procedure for weighing a substance by using a single-arm analytical balance.	3. Weigh and record the reading of a substance using a single-arm analytical balance.
4. Describe in writing the rule for making a compound sentence from two simple sentences by using a conjunction.	4. Make a compound sentence from two simple sentences by writing one of the seven linking words or a comma.
5. Define in writing the six basic patterns with 100 percent accuracy.	5. Determine kinds of sentences by labeling a series of sentences as simple, compound, and complex sentences.

3.1.2.1 <u>How to Categorize Knowledge Objectives.</u> Knowledge objectives are normally lower level enabling objectives that support higher level performance objectives in the learning hierarchies. For example, students must first be taught to remember the definitions, procedures, formulas, etc. before they can solve the problems or use the equipment required by later performance objectives. Most knowledge objectives require students to RECALL or RECOGNIZE facts, names, definitions, formulas, the steps in a procedure, or bodies of knowledge. The distinction between RECALL and RECOGNIZE is very important. It is related to how knowledge will be used on the job. For example, if the job requires a student to have memorized the procedural steps for extinguishing an electrical fire, it would not be appropriate to teach the student to merely "recognize" the procedural steps in a multiple choice question. To RECALL information is a more difficult learning task than to RECOGNIZE. Definitions of Recall and Recognition are provided below:

RECALL OBJECTIVES	RECOGNIZE OBJECTIVES
Require the student to recall verbatim, paraphrase, or approximate what he/she has been taught during instruction.	Require the student to look at or read alternatives and recognize the right answers. The right answer has been encountered during instruction.
Example -Test Item . Define in writing the term discrimination.	Example - Test Item . Select the correct formula from this list.

As stated previously, most knowledge objectives are the type which require students to remember facts, definitions, formulas, etc. Since all of these require basically the same learning strategy, just being able to separate them from performance objectives is all that is required. However, some knowledge items, specifically objectives dealing with "symbol learning" and "system descriptions and nomenclature," require different learning strategies. Use of these strategies can greatly increase effectiveness and reduce learning time. Thus, it is essential that the instructional developer be able to recognize objectives which relate to these items. The following paragraphs will show you how to identify these special learning objectives.

. SYMBOL LEARNING OBJECTIVES. Symbol learning deals with recognizing and naming graphic symbols, such as those used on engineering drawings, weather charts, and insignia. Symbols serve as a brief code which must be decoded by the user. Most symbols have low meaningfulness to the untrained person. All instances of a specific symbol are similar in appearance.

Symbol objectives are not encountered as frequently in instruction as other knowledge objectives. However, it is important to recognize this category of objective because complex symbol learning objectives normally require use of a more specialized learning strategy. This learning strategy is provided in Section 3.1.4.3 of this manual. Look at the following chart for some examples of Symbol Learning Objectives.

EXAMPLES OF SYMBOL LEARNING OBJECTIVES

1. Given audio recordings of all shipboard alarm signals, IDENTIFY, in writing, the meaning of each alarm.

2. Given the symbolic number for a special kind of Present Weather, DRAW its graphic symbol.

3. Given the insignia for all U. S. Navy Aviation Ratings, WRITE the proper name for each of the ratings.

4. Given a sheet containing various electronic symbols and schematic diagrams, CIRCLE those representing integrated circuits and simplified schematics with 80% accuracy.

5. Given a picture of a projectile and its color code, STATE, in writing, the name of the projectile.

6. Given a color illustration of navigation buoys, LABEL each by name.

7. Given a sheet containing random Morse Code symbols, WRITE the letter, number, or punctuation mark each represents.

8. Given a simplified schematic diagram, LABEL the Triac symbols.

9. Given a list of line markings from MIL-STD-1247, and a list of lines (i.e., fuel, oil, hydraulic, etc.), MATCH the line to its appropriate marking.

. SYSTEM DESCRIPTION AND NOMENCLATURE OBJECTIVES. Systems Description and Nomenclature involves recalling the names of equipment components, locating these components on the equipment, and recalling the functions served by them. These are basic enabling skills which make it easier for students to learn to operate or maintain the equipment and to discuss these events with others. Objectives dealing with nomenclature and system description are not encountered as frequently as other knowledge objectives. However, it is important to recognize these objectives because they normally require a more specialized learning strategy. This learning strategy is provided in Section 3.1.4.3. Listed below are some examples of System Description and Nomenclature Objectives.

EXAMPLES OF SYSTEM DESCRIPTION AND NOMENCLATURE OBJECTIVES

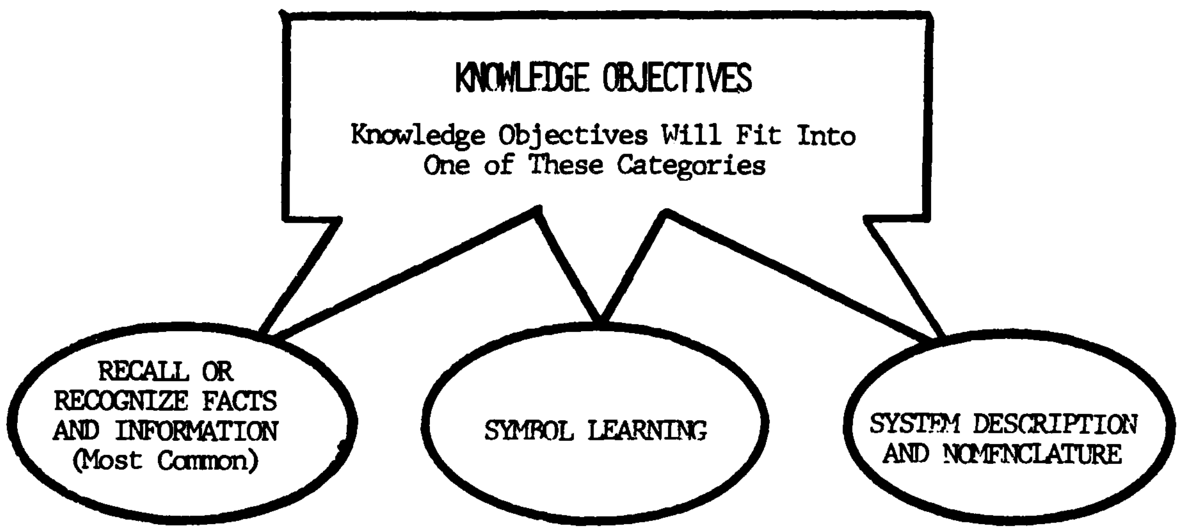
1. DESCRIBE, in writing, in your own words, the automatic operation of the emergency switchboard upon loss and restoration of preferred and alternate ship's service power.

2. MATCH the name of components of the Casualty Power System with statements describing the functions of each.

3. Given an illustration of the Econ II Hot Water Heater, TRACE, by drawing arrows, the flow of seawater from the intake, through the heater, to the diving suit.

4. Given an exploded illustration of a Mk 12 Diving Helmet, LABEL the Exhaust Valve, Air Control Valve, Air Diffuser, and Communications Jack.

. *SUMMARY OF KNOWLEDGE LEVEL OBJECTIVES.* The following chart summarizes the kinds of Knowledge objectives for which instruction will be developed. Recall that most knowledge objectives will fit into the broad, general category of recall and recognition. And, that there are two special categories of knowledge (SYMBOLS and NOMENCLATURE) which must be identified because they do require special learning strategies. Failure to use the best strategy will reduce the quality of the lessons that are developed.



3.1.2.2 <u>How to Categorize Performance Objectives.</u> The previous paragraphs showed how to identify Knowledge objectives in learning hierarchies. The following paragraphs will show how to categorize most of the remaining objectives in the hierarchies. These are PERFORMANCE OBJECTIVES. Most performance objectives used in Navy classrooms will fit into one of three categories: (1) PROCEDURES, (2) RULES AND REGULATIONS, and (3) CLASSIFICATION. Each of these categories requires use of a slightly different learning strategy. These learning strategies are described in Section 3.1.4.

. OBJECTIVES REQUIRING THE USE OF A PROCEDURE. The most common performance objective encountered in Navy courses involves using PROCEDURES. Using a PROCEDURE requires carrying out a sequence of steps in the same way each time it is performed, e.g., disassembling, inspecting, and reassembling a weapon, pump, etc. If the procedure is performed without a job-aid, students must REMEMBER the steps and their order before they can perform the procedure. If the procedure is performed with a simple check list type job aid, students must REMEMBER the detailed actions for each step. The best learning strategy for this category normally combines the two different levels of learning: RECALLING the steps of a procedure and PERFORMING the actions required to do the procedure. Recalling the procedure is basically a mental operation, while performing the procedure includes physical actions. In this situation, the emphasis is placed on recalling the sequence of the steps and the chaining of steps into a smooth sequence. Learning strategies for procedure objectives are provided in Section 3.1.4 of this manual. Examples of Procedure Objectives are listed in the following chart.

EXAMPLES OF PROCEDURE OBJECTIVES

1. As a member of a two-man team, DRESS a diver in a Mk 12 Surface Supported Diving System in accordance with procedures contained in the U. S. Navy Diving Manual, Volume 1, within 12 minutes, so that (s)he can safely enter the water.

2. Given the maintenance manual for the specific vehicle, tools, and a set of new spark plugs (4, 6, or 8), CHANGE the spark plugs in the vehicle. The vehicle should start and idle smoothly following the operation.

3. PERFORM, from memory, the normal startup procedures for the #1 engine of a SH-3H Helicopter.

4. Given an IBM Selectric typewriter and a new ribbon cartridge, CHANGE the ribbon without error in accordance with the manufacturer's manual.

5. PERFORM, from memory, an operational check on the Cutler Hammer Static Logic Elevator to ensure that the proper switches are engaged to limit the elevator's travel.

. OBJECTIVES REQUIRING THE USE OF RULES AND REGULATIONS. This category involves the application of rules when performing a job. The rules may include requirements stated as regulations, or as current practice, or guidelines based on an expert's knowledge of the job. Rules are frequently expressed as IF/THEN statements: i.e., "If this happens, then do this." The student merely selects the proper rule and applies it correctly. Since rules are expressed through words, formulas, and equations, an understanding of the precise meaning of words in the rule becomes important. Like procedures, students must first remember the rule before they can apply it. Both learning the rule and applying it are normally combined into a single learning strategy. Learning strategies for difficult to apply Rules and Regulations are provided later in Section 3.1.4. The following chart contains examples of Rule and Regulation Objectives.

EXAMPLES OF RULE AND REGULATION OBJECTIVES

1. Given a scenario describing the length of a ship, type of operation, time of day, location, and condition of the ship, NAME, in writing, with 90% accuracy, the lights which should be illuminated in accordance with the Rules of the Road.

2. Using the outline contained in OPNAVINST 5500.1 as a guide, DESTROY simulated classified documents.

3. Using procedures in OPNAVINST 3120.32, TAG OUT a Cutler Hammer Elevator.

4. Given the depth, number of divers, and work to be performed for a typical working dive, COMPUTE the compressor output necessary to sustain the divers safely. The answer must be within +/- 10 psi of the correct answer.

5. Given an American Flag, an Illinois State Flag, and a specific command flag on poles with stands, ARRANGE them on a speaker's platform in accordance with U. S. Navy directives.

6. Given the name and symptoms of a typical diving disease, RECOMMEND, in writing, the proper treatment.

7. Using information from simulated personnel records, COMPUTE Active Duty Service Dates (ADSD).

8. Provided a scenario concerning damage to a ship requiring implementation of damage control procedures, PREPARE a Damage Control Message in accordance with U. S. Navy directives.

9. Using the Training Device Utilization Form, DOCUMENT the utilization of training devices in one classroom for one day of instruction.

. OBJECTIVES REQUIRING CLASSIFYING INFORMATION. Classification objectives involve assigning a category name to all objects or events that have certain essential characteristics. For example, a SONAR return is classified as "sub" or "non-sub" based on critical features of an echo. Things classified into a specific category usually are not identical--they merely have a set of similar characteristics: i.e., "sub" contacts may appear to be very different, yet they exhibit certain similar qualities that mark them as "submarines." Learning strategies for classification objectives are also provided in Section 3.1.4. Some examples of Classification Objectives are listed in the following chart.

EXAMPLES OF CLASSIFICATION OBJECTIVES

1. Given video tapes of five accident victims and written descriptions of their symptoms, IDENTIFY which are (is) in shock. State your answer by circling the case number of the shock victim(s).

NOTE: The above is a classification objective because the student must first know ALL of the symptoms of shock and then determine which victims exhibit all the symptoms. If a victim exhibits some, but not all symptoms, he/she is probably not in shock.

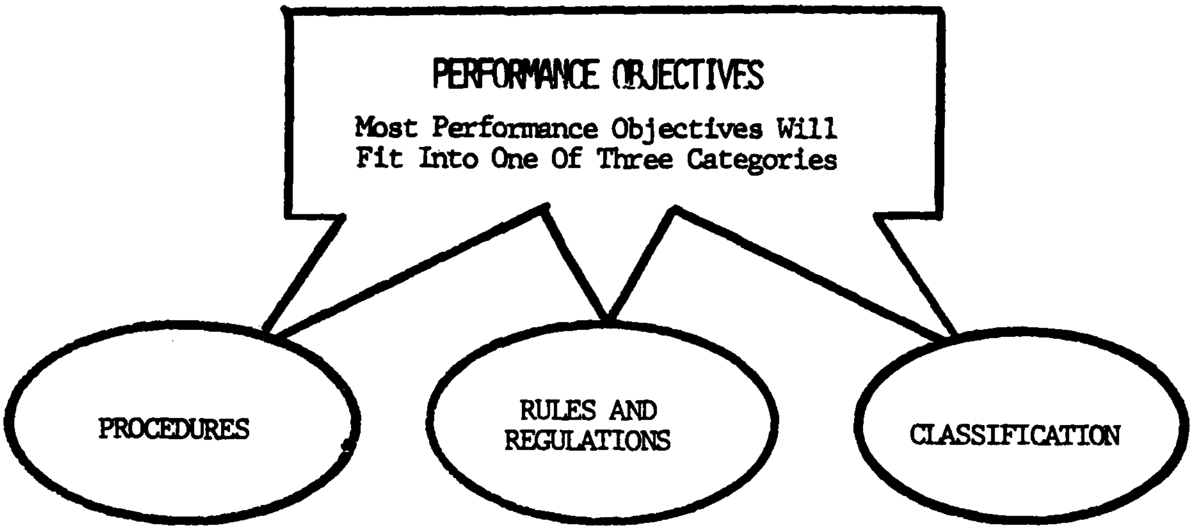
2. Given ten scope photographs of intercepted radar signals, IDENTIFY, by labeling, the source radar as either early warning, surveillance, or intercept.

NOTE: The above is a classification objective because students must first know the parameters and characteristics of each of the three types of radars, then recognize these characteristics in each scope photograph, and finally, based on this evaluation, assign each photograph to one of the three categories of radars.

3. Given five pictures showing the interior/exterior of a ship that has sustained damage, IDENTIFY, by labeling, those instances which would warrant implementation of damage control procedures.

NOTE: The above is a classification objective because students must first know the characteristics (or definition) of damage which is severe enough to warrant damage control procedures. They must then determine if the damage in the photographs is at least as severe (or matches) these characteristics. If all characteristics are present, damage control procedures should be implemented. If one or more characteristics are missing, then damage control procedures may not be required.

. SUMMARY OF PERFORMANCE OBJECTIVES. The following chart summarizes the categories into which most performance objectives will fit.



3.1.3 Problem Solving, Physical Skills, and Attitude Objectives. The categories of Knowledge and Performance objectives discussed on the previous pages include the vast majority of objectives found in Naval training programs. However, they do not include objectives which require the development of "attitude" or "motivational" changes (often called ATTITUDE objectives) or objectives requiring development of pure "motor" skills (often called PHYSICAL skills). Also, objectives requiring complex Problem Solving and Decision Making have not been discussed. Each of these categories also requires a different learning strategy. For example, instruction designed to change attitudes could require heavy use of case studies and group discussion. Conversely, instruction designed for a physical skill such as hitting the keys on a typewriter requires heavy use of demonstrations and practice. Since these kinds of objectives do appear in many courses, a more detailed

explanation of each is provided below. For information on learning strategies for these objectives, refer to Block III.1 of NAVEDTRA 106A.

. PROBLEM-SOLVING AND DECISION MAKING OBJECTIVES. Problem-solving is the most complex form of learning and incorporates all the lower levels of knowledge and skill objectives discussed previously. In problem-solving, a student must recall information, follow procedures, classify objects, and select rules, and then formulate a new rule that may apply to the problem at hand. The new rule must be tested to see if it works in the situation. If it works, it is retained. If it does not work, it is rejected and a new rule is devised. Troubleshooting malfunctioning equipment is a good example of problem-solving.

Thus, when teaching problem-solving, it is important to ensure that students have already learned all lower level knowledges and skills required to solve the problem. These lower level objectives should be identified in the learning hierarchy from Section 2.1.

. PHYSICAL SKILLS OR MOTOR SKILL OBJECTIVES. These objectives involve some physical or manipulative activity. They require movement of some of the muscles of the body and are directly observable. Many performance or "use" objectives require both mental and physical skills; for example, adjusting the front panel knobs while operating a radar set. Following are examples of typical physical skills.

MANIPULATIVE PROFICIENCY	EXAMPLE
Control precision -- making fine, highly controlled muscular adjustments.	Tuning the jets of a carburetor.
Multi-limb coordination -- cordinating the movements of a number of limbs simultaneously.	Controlling rudder and manipulating throttle.
Response orientation -- making the correct movement in relation to the correct input, especially under high-speed conditions.	Emergency braking (as opposed to incorrectly depressing the clutch.
Reaction time -- speed with which an individual is able to respond to an input when it appears.	Applying brakes at stop soon enough to stop.
Rate control -- making continuous, anticipatory motor adjustments relative to changes in speed and in direction of a continuously moving object.	Tracking a target on a display.
Manual dexterity -- making skillful, well-directed arm-hand movements in manipulating fairly large objects under speed conditions.	Planing a board or otherwise working with hand tools.
Finger dexterity -- making skillful, controlled manipulations of tiny objects, primarily using the fingers.	Repairing a watch.
Arm-hand steadiness -- making precise arm-hand positioning movements when strength and speed are minimized.	Assembling a printed circuit-board.

.. ATTITUDE OBJECTIVES. Attitudes are not always observable, but are reflected in the choice a person makes. Thus, a person with a positive attitude toward job safety is one who chooses to practice good safety habits. Some examples follow.

ATTITUDE OBJECTIVES

ACTION	BEHAVIORAL ATTRIBUTES	EXAMPLES
Abide Accept Comply Choose Select	1. Concerns exhibiting a pattern behavior consistent with an attitude or value.	1. Complying with known safety standards while performing a maintenance procedure on a high voltage supply in a radar set.
	2. Concerns willingness to perform according to a standard as opposed to skill to perform according to that standard. (NOTE: A person can have a high level of skill but choose not to perform in a skillful manner.)	2. Conforming to the standard of keeping one's bunk area neat and clean when the opportunity exists to do otherwise.
	3. Concerns integrating or organizing a value or attitude into a pattern of behavior.	3. Abiding by security regulations when handling classified information.
		4. Accepting the need to take risks when necessary to protect the lives of teammates.
		5. Complying with a request to repair a malfunctioning radio circuit with greater than normal speed when a quick response is required.

3.1.4 Specify the Most Effective Learning Strategy

In this manual, a learning strategy is defined as the way in which the content of a lesson is arranged and presented to students. The common goals of a learning strategy are: maximum effectiveness (the fewest errors); maximum efficiency (least time to perform); maximum retention (continued low error rate over time); and maximum appeal (students feel that they are learning and seek additional opportunity to learn).

Learning strategies must be specified because all learning objectives do not require the same instructional treatment for optimum learning to take place. For example, remembering information (a knowledge objective) is not learned the same way as measuring pulse width using an oscilloscope (a performance objective). Each category of objective requires a different "learning strategy."

Experience regarding what makes certain learning strategies more effective than others has shown what many curriculum developers already know: effective instruction must include (1) clear statements of what the learner is supposed to be able to do after the instruction, (2) an introduction which motivates students to learn the material, (3) a precise presentation of the information to be learned, (4) examples of how the material to be learned is applied, (5) opportunities for the learner to practice the material learned, and (6) information giving the correct answers to practice exercises and the reason for it. These key elements or pieces of instruction can be referred to as LESSON COMPONENTS.

Thus, we can say that learning strategies normally contain these six components and can define Lesson Components as the identifiable pieces of an overall learning strategy that perform specific functions in the lesson. Lesson

Components are the basic building blocks of a lesson which are generally required if the lesson is to be maximally effective and efficient.

The six basic lesson components referred to in this manual are called:

1. OBJECTIVE
2. INTRODUCTION
3. ESSENTIAL (or CORE) INFORMATION
4. EXAMPLES or DEMONSTRATION
5. PRACTICE
6. FEEDBACK

Lesson materials which teach PERFORMANCE objectives will normally require all six of the above Lesson Components. Lesson materials which teach KNOWLEDGE objectives normally require only five of the six components. (EXAMPLES are not normally required in learning strategies for knowledge objectives.)

When sequencing lesson components in a lesson it is also important to "separate" and "identify" each component for the student. A lesson is of higher quality to the degree to which the lesson components (e.g., explanations, examples, and practice) are separated and labelled in such a way that students can easily locate and study each component as desired.

Too often, the key elements of a lesson are buried in lengthy explanations so that it is difficult to determine what core information students are required to remember or use. This situation has been called "instructional hide-and-seek"; the instructor hides the critical information and the students try to find it.

To avoid such inefficiencies, the six lesson components (Objective, Introduction, Essential Information, Examples, Practice, and Feedback) should be separated and clearly labelled so that students' time can be spent learning the critical material instead of trying to locate it.

The paragraphs which follow list effective learning strategies (and associated lesson components) for both Knowledge and Performance objectives. These strategies apply to both printed instructional materials and lectures. They should also be used when developing audiovisual lessons for most objectives, e.g., sound-slide lessons and video tapes. For example, a good lecture for a performance objective would contain an introduction, an explanation of the core information, enough examples and practice, and appropriate feedback. The lecturer would also ensure that his explanation, examples, and practice are consistent with the learning objective and test items.

3.1.4.1 Learning Strategies for Knowledge Objectives. Previously, Section 3.1.2 defined knowledge objectives and explained how to identify them in course curriculum outlines. This section provides guidance regarding how to develop efficient and effective lesson materials for KNOWLEDGE objectives.

When developing lesson materials for most knowledge objectives, include the following components: (1) OBJECTIVE, (2) INTRODUCTION, (3) ESSENTIAL INFORMATION, (4) PRACTICE, and (5) FEEDBACK.

> EXAMPLE: A lesson for a knowledge objective should be presented in this manner: After INTRODUCING the lesson, state briefly and concisely the ESSENTIAL INFORMATION which the student must remember. Exclude all nonessential information from this statement. Next, give the students some additional assistance to help remember the information. Some ways to do this are to relate the new material to previously learned material, or use memory aids such as rhymes, jingles, etc. Next, give the students PRACTICE remembering the material and immediate FEEDBACK regarding the correct answer. The more there is to be remembered, the more practice that is needed.

. GUIDELINES FOR DEVELOPING LESSON COMPONENTS FOR KNOWLEDGE OBJECTIVES

Lesson Component 1: OBJECTIVES

Objectives must be clear statements of what the learner is expected to be able to do after the instruction. They also provide the conditions and standards of performance. Objectives in instructional materials must be written in terms that students can understand.

Lesson Component 2: INTRODUCTION

The introduction provides the necessary student orientation, overview, purpose, and instructions to get students ready for instruction and provides smooth transitions between lessons. An Introduction could answer any of the following questions about the lesson.

1. What is the lesson about?

2. Why do I have to learn the information or skill presented in this lesson?

3. How does this lesson relate to previous or future instruction?

4. Is there anything especially interesting about the topic(s) presented that would motivate me to learn?

5. Is there anything else I need to know about this lesson that has not been presented previously or recently?

Lesson Component 3: ESSENTIAL OR CORE INFORMATION

Essential information is the facts, names, events, functions, definitions, procedures, formulas, etc. which students must be able to recall or recognize. Essential information should be presented in lesson materials as follows: First, give the student a concise, brief STATEMENT

of the essential information which must be recalled or recognized. Exclude all nonessential information. Second, give the student some ADDITIONAL HELP in remembering the material. Adequate STATEMENTS of essential information and ADDITIONAL HELP should use one or more of the following guidelines.

STATEMENTS OF CORE INFORMATION. These are the simplest, most concise statements of the critical information required to meet the objective. An adequate STATEMENT satisfies the follwing criteria.

1. Accurately and exactly states all information necessary to meet the objective.

In order to meet the objective, students must have access to all of the necessary information. In addition, that information must, of course, be accurate. Also, only the material required by the objective should be presented--nothing else.

2. Names by title, the information to be learned and, when appropriate, gives the number of items.

It is important to include a title so the student can easily recall the information. Titles or names are particularly helpful when several items of information are involved, because they organize the information so the relationship between the items is clear. Also, if several items of information are to be learned, knowing the number helps the student keep track of the pieces of information. For example, in learning a list of six items, the student knows immediately that his or her performance is inadequate if he or she can only state five of the six items. In determining whether the number of items is necessary, check the objective to see if it requires listing behavior. If so, including the number of items will be helpful to the student.

3. Is concise and logically organized.

Statements of essential information should be presented as briefly as possible while still providing all the information necessary to meet the objective. Organizing the material logically helps to achieve conciseness. It also makes the material far easier to learn. For example, suppose students are asked to remember the basic type of currency for each of 51 countries. Alphabetically, the countries would make the learning task a lot more difficult than it should be. A more logical approach would be to present the countries grouped by currency type. In addition, information should be presented briefly and in table or list form, whenever possible, to make the information easier to locate.

4. Exclude all nonessential information.

If nonessential information is included in a statement of core information, students may think they have to learn it to meet the objective. This is unnecessarily confusing and decreases the effectiveness of the instruction. If the nonessential information is helpful as background information, include it in the introduction or the additional information. If it is critical information, but not required by the objective, it should be taught in another lesson.

5. Avoid unknown or unfamiliar terms and symbols, whenever possible.

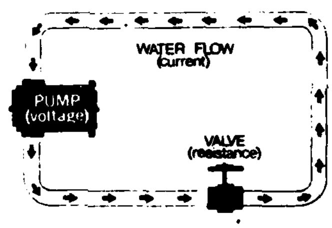
When unknown or unfamiliar terms or symbols appear in the statement of essential information, its effectiveness is weakened. Whenever possible, all terms or symbols should have been addressed in previous lessons. If you can't avoid using unfamiliar terms or symbols, explain them in the introduction or in the additional information.

"ADDITIONAL HELP" FOR REMEMBERING ESSENTIAL INFORMATION. Even though the core information which students must remember has already been precisely stated, most students will need additional help in remembering the material. The "Additional Help" should be separated from the

"Core Information" and clearly labelled so students can locate it and understand what portion of the lesson they are studying. Following are guidelines for developing adequate additional help. One or more may apply:

1. Relate the new material to previous learning.

Often, what students already know can help them learn new material. This can be done by referring back to earlier learned information (e.g., "The controls for the ASQ-10 are very similar to those of ASQ-81 . . . "), or by using an analogy. Analogies are only useful if not contrived and if clearly related to the new material. For example, in teaching how voltage, resistance, and current operate in a circuit, the analogy of a water pump could be used.



2. Illustrate the material in a memorable way by using graphics.

Graphics can be used to explain information which was initially presented in written form. For example, if students are asked to memorize the locations of all the fire extinguishers in a building, a drawing pinpointing all their locations graphically could be very helpful. Graphics are used very effectively in the illustrations in Section 3.1.4.3.

3. Use a rhyme, acronym, chunking, or other memory aid.

Clever rhymes and acronyms are often used to help learners remember facts. You're probably familiar with several. For instance, to help

remember the number of days in each month, there is the rhyme that begins, "Thirty days hath September . . ." To help remember the notes of the treble clef that appear between the lines, we use the acronym FACE. Use TAEG Report No. 60, Use of Mnemonics in Training Materials: A Guide for Technical Writers, for help in creating memory aids. Whenever you use either of these techniques, remember that while clever rhymes and acronyms are very helpful, contrived aids are very confusing. When materials do not lend themselves to the creation of good rhymes or acronyms, it is better to use a different type of help.

4. Organize the steps, operations, or critical characteristics into small groups (chunks).

Experience indicates that most students can memorize lists of five to nine items fairly easily. Therefore, when teaching a long list of steps, operations, or critical characteristics, it may be helpful to break the list into smaller chunks. Students may find it easier to learn three small chunks than one long list. To work most effectively, there should be some logic behind the way the items are grouped together.

5. Illustrate each step, operation, or critical characteristic in a memorable way by use of graphics. Look at the illustrations in Section 3.1.4.3 for some excellent examples of illustrating critical characteristics.

Associating something to be remembered with a vivid, visual image is often useful. In such cases, the graphic should be as unambiguous as possible. This means that the graphics used should be concrete in nature and that each should illustrate some particularly distinctive feature of the step or characteristic to be memorized. This technique is particularly useful if the content being taught is inherently visual. For instance, it would be very easy to illustrate the characteristics of a bicycle (two wheels, pedal-powered) because you can see wheels and pedals. These characteristics are concrete rather than abstract.

6. Present a memorable description or example of the steps, operations, or characteristics.

If the content (rule, classification, or procedure) being taught is not easily illustrated by a graphic, a vivid written image can sometimes be developed. The students read the written description, form an "image" in their minds of the step being performed or the characteristic described, and then use that to help retrieve from memory the things memorized. As with a graphic image, any written description or example should be concrete and should describe some particularly distinctive feature of the step or characteristic.

7. Clearly link the help to the core information to be learned.

Any help used must be fully explained so students do not have to figure out what to do with the information to be learned. For example, when using the water pump analogy to teach how voltage, resistance, and current operate in a circuit, you would want to tell the student why the analogy was included and how it was supposed to explain the core information.

8. Do not add substantially to the memory load.

Any help or memory aid must be brief, sensible, and easy to learn fast and well. Complex and hard-to-learn memory aids are useless because they only add to the difficulty of learning the important core information.

9. Exclude nonessential information from the additional help.

Nonessential information is undesirable because it only clutters the help and draws attention away from the essential information.

Lesson Component 4: PRACTICE

Practice is probably the most important part of the lesson. It is the key for learning. The

more there is to be learned, the more practice is needed. For knowledge objectives, practice items require learners to state or recognize facts, objects, names, functions, formulas, definitions, etc. Following are guidelines for developing adequate practice for recall and recognize learning objectives. Some or all may apply.

1. Require the student to perform the exact task as stated in the objective and to use the same conditions and standards.

If the conditions state that the student will be given an illustration, sample items, an incomplete table, or any other information, the final practice conditions must provide the same information or materials. Futher, if the action says "state," the item directions must require the student to make a stated response (either stating or listing some information from memory). Also, if the standard requires including all notes and cautions (or some other special response), the item directions must indicate that.

2. Require only information found in the statement of core information.

A practice item may test only the information contained in the core information. If a practice item tests information which the author agrees is important, that information should be included in the core information.

3. Use the appropriate test item type.

The item format should be appropriate for testing the kind of behavior called for by the objective. If the objective requires recall then merely recognizing the answer in a multiple choice question is not an adequate final practice item.

4. Provide adequate directions and space for completing the item.

Each practice item should tell the student how to make the desired response (e.g., "state the items in the space provided below," "circle the appropriate answer," "label the controls on the

attached illustration by writing the name next to each relevant control," etc.), what information is given in the item, and the criteria for performance (e.g., if exact order is important, or exact words or paraphrase acceptable). Directions should be complete and specific. Also, provide adequate space for a complete response. The amount of space needed for the average student to make a complete response should be provided after the item. For fill-in-the-blank, short-answer, or multiple-choice items, lines should be drawn to indicate the placement and approximate length of answers.

5. Use graduated practice for objectives which require recalling complex or lengthy information.

This is used only when students need more help to learn the necessary information. Graduated practice goes from easy to hard so that students gradually master the objective, thereby making final recall easier. Following are some techniques for graduated practice.

Initial practice items should be similar to and less difficult than the final behavior indicated in the objective.

It is important to remember that recognition behavior is not as difficult as recall behavior, and that cued recall is not as difficult as umprompted recall. Therefore, ask students to perform a less difficult recognition task (multiple choice or matching) during graduated practice than they need to demonstrate when doing the final practice for recall. For example, graduated practice might first require students to "match" symbols and their meanings, then to "fill in" part of them, and finally to list (recall) all symbols and their meanings.

Graduated practice should call for responses that are only portions of the total response required in the final practice. For example, if teaching a long, complex list that was easily divided into three smaller chunks, the graduated practice might require students to list the first

chunk, then the second, then the third, then the first and second chunks, until they could list all of them without error. The final practice item would require students to list the entire list given in the essential information.

Graduated practice should present more cues than are presented in the final practice. If the final practice requires recall without cueing, then the graduated practice may use cued recall.

Graduated practice should sequence toward accomplishment of the final practice item(s). It is appropriate when more than one activity is designed, that the requirements of the activities become gradually more difficult, coming closer and closer to the behavior required in the final practice item. In other words, during graduated practice, students are asked to remember larger and larger portions of the material they need to learn with fewer and fewer cues. Remember, however, graduated practice should not be more difficult than the final practice. The final practice item should be the ultimate goal.

Lesson Component 5. FEEDBACK

Feedback for knowledge level lessons simply provides students with the correct answer to compare with their own.

To develop adequate feedback:

1. Provide an immediate and complete answer to the item.

All parts of the correct answer or answers should be provided. If alternative answers are acceptable, each should be included.

2. Provide the learner with immediate access to the feedback.

For example, place the feedback on the back of the practice page or on the next page.

3. Clearly display the feedback and identify the item to which it relates.

This is especially important if there are a number of answers on a page. In any situation, however, students should be able to locate answers as quickly as possible. The feedbacks should be numbered in the same way as their corresponding practice items. It is also helpful to place the feedbacks in the same locations on their pages as their corresponding practice items. Answers should be displayed in the same manner learners were asked to supply them.

4. Provide guidance for remediation.

The purpose of feedback is to help students learn the material. Therefore, it should be designed so that the student is led to restudy the information he failed to recall or recognize.

3.1.4.2 Learning Strategies for Performance Objectives. When developing lesson materials for most performance objectives include the following components: (1) OBJECTIVES, (2) INTRODUCTION, (3) ESSENTIAL INFORMATION, (4) EXAMPLES, (5) PRACTICE, and (6) FEEDBACK.

. GUIDELINES FOR DEVELOPLING LESSON COMPONENTS FOR PERFORMANCE OBJECTIVES

"Lesson Component 1: OBJECTIVES"

Objectives must be clear statements of what the student is expected to be able to do after he instruction. They also provide the conditions and standards of performance. Objectives in instructional materials must be written in terms that students can understand.

"Lesson Component 2: INTRODUCTION"

Provide the necessary learner orientation, overview, purpose, and instructions to get learners ready for instruction and provide smooth transitions between lessons. Introductions could answer any of the following questions about the lesson.

1. What is this lesson about?

2. Why do I have to learn the information or skill presented in this lesson?

3. How does this lesson relate to previous or future instruction?

4. Is there anything especially interesting about the topic(s) presented that would motivate me to learn?

5. Is there anything else I need to know about this lesson that has not been presented previously or recently?

"Lesson Component 3: ESSENTIAL OR CORE INFORMATION"

. First, give the student a brief, concise STATEMENT of the essential (core) information needed to perform the lesson objective and nothing else. All nonessential information should be avoided. The purpose for stating the core information is to organize, in advance, clear-cut information about what is to be learned. Statements of essential information for performance objectives should include the following as applicable:

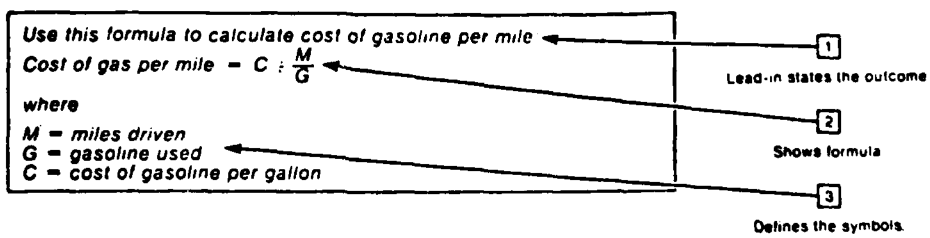
1. Lists of the steps or operations required to perform the objective. Explicit safety precautions should be included as separate steps. (Include definitions of unfamiliar terms in formulas.)

2. Lists of the critical characteristics which students will need to distinguish one object from another (e.g., friend or foe; common cold or pneumonia).

3. A statement of the rule or regulation to be followed.

Following are examples of adequate statements of essential information:

a. A vessel not under command shall exhibit two all round red lights in a vertical line where they can best be seen. When making way through the water, use sidelights and a stern light.



After stating the core information, then second, provide an EXPLANATION of how to apply it. (Note: The "Core Information" and "Explanation" should be "separate" and "identified" so students can locate them.) Even though the core information discussed above contains all the information necessary to perform the objective, most students require additional explanations and guidance on how to apply it. A variety of techniques may be used to accomplish this; following are some of the most effective. One or more may apply.

1. In the "explanation," relate the core information to the student's prior knowledge or experience. Example: "As you may remember from Lesson Topic 3.5."

. In the "explanation," give the reasoning behind the core information. Explain why some piece of information is particularly important or why something is performed the way it is. Understanding why helps students remember and apply the information.

3. Make the explanation "job relevant." For example, include a description of the job environment and how the information will be applied on the job.

4. If no job aid is provided, ensure that students can recall all the steps, operations, or critical characteristics stated in the core information before they are required to apply it in practice exercises and tests. Using one or more of the following techniques can make the information easier to remember. (Also, the illustrations in Section 3.1.4.3 provide excellent examples of how this is accomplished.)

- Create a visual or verbal memory aid to help students remember the most difficult steps or characteristics. For example, aviators use this jingle to help them to remember whether to add or subtract magnetic variation: "East is least and West is best." Use TAEG Report No. 60, Use of Mnemonics in Training Materials: A Guide for Technical Writers, for help in creating memory aids.

- Organize the steps or operations into small groups or "chunks." Most students can memorize lists of five to nine items fairly easy. To work most effectively, there must be some logic behind the way items are grouped together.

- Illustrate each step or operation in a memorable way by use of graphics.

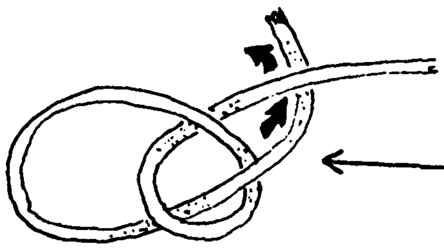
5. Show an example or demonstration of how the rule or procedure is applied to a specific situation (demonstrations are always used when

teaching procedures). They may be performed live by an instructor or presented in audiovisual form or in a workbook.

6. Point out and explain common errors. Include in the explanation errors that are typically made in performing the task. Provide an explanation of how the errors can be avoided. Example of common error:

Cross the end of the line under the main part of the line.

It is easy to confuse this step and cross the end over the main part of the line. Be sure you cross under.



Points out common errors

Uses illustrations for clarification

7. Since most students learn better when pictorial information is included in the text (or lecture), use pictures, illustrations, graphics, etc. when appropriate.

"Lesson Component 4: EXAMPLES or DEMONSTRATIONS"

"Examples" are used for rule and classification objectives and "demonstrations" are used for procedure objectives. Learning strategies for categories of objectives which involve use of "rules," "regulations," and "classification" require many "examples" showing how the core information is applied to a variety of situations. Since "procedures" are performed in the same way each time, examples are not required; only a "demonstration" showing how the steps are performed.

. HOW TO DEVELOP ADEQUATE EXAMPLES

When teaching performance objectives involving the use of rules and regulations, or the

classification of objects, it is important to present a range of examples to ensure complete learning of the objective. Otherwise, students may have difficulty applying the rule or classification in job or test situations which are different from the examples they have seen.

An all too frequent problem with instruction is the lack of a sufficient number of examples. Most writers are already accustomed to writing single examples, but they tend to rely on that one example for all their instruction and then are surprised when students cannot recognize other examples. Also, some writers mistakenly think that examples are fine for grade school students, but that adults can somehow learn without any illustrative material. This problem can be called "explanation rich" but "example poor" instruction.

To develop adequate examples:

1. Cover the full range of situations or data which students may encounter.

2. Point out and explain common errors, or situations which most students find difficult. Include common errors typically made on the job.

3. Ensure that examples range from easy to hard.

4. Present a step-by-step application of the objective: When objectives have specified steps, the examples should include a step-by-step application with each step clearly indicated and labelled. For a formula, each logical step should be presented clearly.

5. All examples should be consistent with core information, practice, and test items.

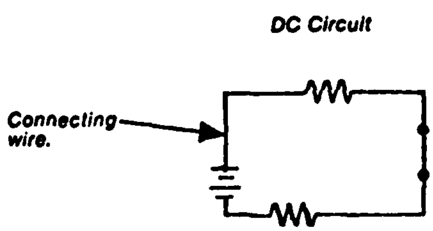
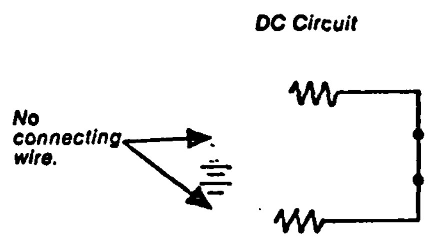
6. For "classification" objectives, students usually learn better when both "exmples" and "nonexamples" of the object being classified are presented. Showing nonexamples which lack one critical characteristic of the object, and pointing out the missing characteristic will help students learn to recognize legitimate examples.

Example: Following is an Example-Nonexample Pair

DEFINITION OF A COMPLETE CIRCUIT:

A complete circuit has the following characteristics

1. Voltage source.
2. Connecting wires.
3. Load or loads.
4. Unbroken electron path.

<table>
<tr><th>This is a Complete Circuit</th><th>This is not a Complete Circuit</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

. HOW TO DEVELOP ADEQUATE DEMONSTRATIONS

Since procedures are always performed the same way on the job, only one example of how the procedure is applied is required. This is called a DEMONSTRATION. A Demonstration is used as a concrete example of how a procedure should be performed and includes explanations of difficult steps. Procedures may be performed live by the instructor, presented in audiovisual form, or appear in a workbook.

To develop adequate demonstrations:

1. Begin with a description of the specific situation in which the procedure will be demonstrated. Include all necessary tools and equipment.

Example: "For this demonstration we will use a grasshopper jack to change the right rear tire on a standard-sized automobile."

2. Cover all steps in the order presented. Point out and explain common errors.

3. Indicate all steps requiring decisions and show the response for each decision. Although most procedures involve a set of steps, all of which are performed the same way every time, some procedures may require decision steps within the procedure. Draw the students' attention to these steps. This can be done by using the "if . . . , then . . . " format, e.g., "if you see this condition, then do . . ."

4. Exclude all nonessential information from the demonstration.

"Lesson Component 5: PRACTICE"

Since the purpose of instruction on performance objectives is to "prepare" the student to "perform" the objective, adequate practice is essential to achieving this goal. Failure to provide adequate practice is a common mistake when developing instruction. Practice items are generally self-graded. Both practice and test items use the same form but are generally alternate versions.

To develop adequate practice items:

1. Provide enough practice. Provide students with multiple opportunities to apply the rule, regulation, or classification across a full range of situations he/she will encounter on the job. There should be sufficient practice for even the slowest students to learn the material.

2. Provide students with the opportunity to make common errors. Practice feedback should then clearly show why the error is wrong and how to avoid it.

3. Practice items should progress from easy to hard.

4. Practice items should be like test items. They should be free of hints and additional instruction.

5. All practice items should be consistent with the learning objective, lesson presentation, examples, and test items. When a student finishes the practice items, there should be no doubt about what the test will be like.

"Lesson Component 6: FEEDBACK"

It is important that the student be informed of the quality of his or her performance on practice items as soon as possible. For performance objectives, it is usually not enough to merely give the students the correct answer. They should also be given an explanation of how to arrive at the correct answer so they are able to find their mistakes. Feedback could also direct students to the appropriate sections in the study materials for remedial help.

To develop adequate feedback for practice items:

1. Give immediate feedback on each practice item. Show the correct answer worked out and give an explanation of how to arrive at the correct answer.

2. For practice involving a step-by-step format, the feedback should show all the logical steps worked out.

3. Point out and explain common errors which may have been made.

4. When possible, include additional information in the feedback or a different version of the information.

3.1.4.3 Format Models for Complex Types of Knowledge and Performance Objectives. The learning strategies for knowledge and performance objectives which were previously provided in Sections 3.1.4.1 and 3.1.4.2 are general strategies which have broad application and should be used for most objectives in course curriculum outlines. However, some of the more complex kinds of objectives, which students traditionally have difficulty in learning, will require "additional," more specialized instructional treatment. This Section discusses five such kinds of objectives and provides job oriented FORMAT MODELS to use as guidelines in developing instruction for each. The kinds of objectives which require this special treatment usually involve SYMBOL LEARNING and SYSTEM NOMENCLATURE objectives which require heavy memorization; also, lengthy, complex PROCEDURES, RULES and REGULATIONS, and CLASSIFICATIONS. Figures III-1 through III-5 provide a separate FORMAT MODEL for each kind of objective described above. When objectives appear to match the ones in these formats, they should be further evaluated to determine if the format should be used.

Each of the five FORMAT MODELS provides guidance on how to use techniques which have proven to be especially effective ways of handling difficult-to-learn subject matter. Some of these techniques are:

1. Highly illustrated lesson material where pictorials communicate the information and printed words are used only to clarify.

2. Breaking up lengthy procedural steps or large bodies of information into smaller pieces to facilitate memorization and learning.

3. "Memory Aids" to facilitate recall of hard to remember information.

4. Visual prompts in the form of arrows to direct attention to key items.

5. Heavy use of practice exercises and controlled feedback.

Recall that all of these techniques were briefly mentioned in previous sections covering general learning strategies for knowledge and performance objectives. The FORMAT MODELS in this section provide excellent examples and guidance on how these techniques are combined to achieve maximum learning efficiency for complex subject matter. Therefore, even though these FORMATS are designed for the more complex objectives, curriculum developers should be thoroughly familiar with their content and apply some or all of these techniques as appropriate to lesson materials.

Following are instructions on how to use the five FORMAT MODELS.

1. If the learning objective involves SYMBOLS, SYSTEM DESCRIPTION AND NOMENCLATURE, PROCEDURES, RULES and REGULATIONS, or CLASSIFICATIONS, refer to the appropriate FORMAT MODEL (Figures III-1 through III-5).

2. If the task required by the objective involves learning of skills like those in the FORMAT MODEL, then follow the procedural steps provided in the model. If the model as a whole is deemed inappropriate, use any appropriate techniques in the model and refer to the strategies for knowledge and performance objectives in Sections 3.1.4.1 and 3.1.4.2 for further assistance in developing the instruction.

3. Note that in each FORMAT MODEL, instructions to the curriculum developer are printed on the outside margin of each page. Arrows point to an example of each step.

FORMAT MODELS

General page layouts for use in designing training materials to teach:

Symbol Format

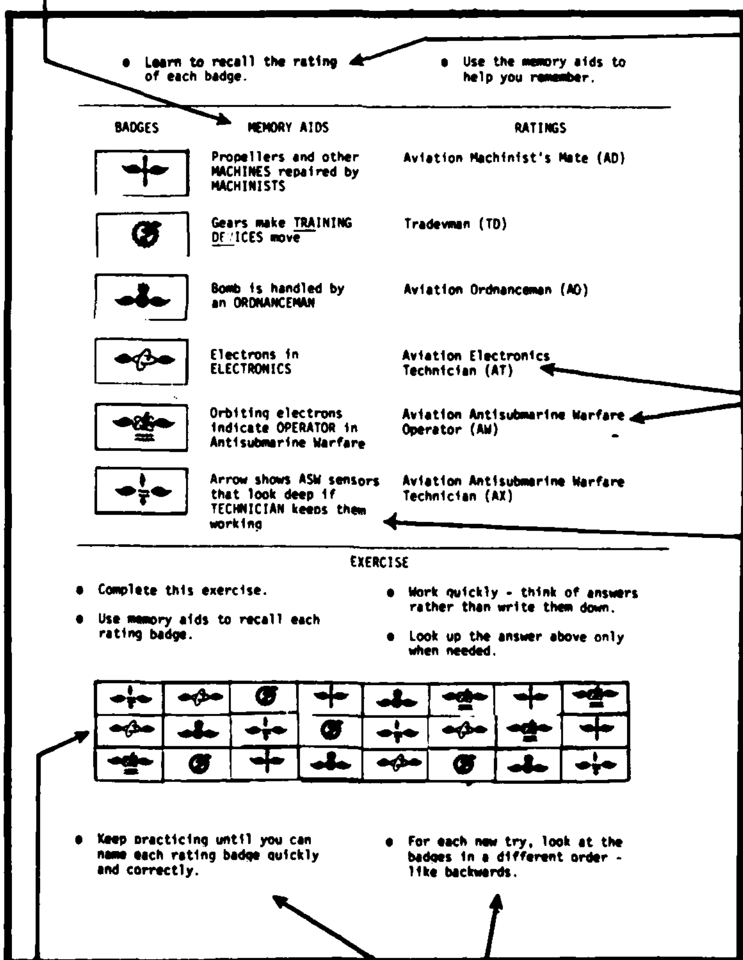
A general format for use in designing training materials presenting symbols that must be recognized and their names recalled.

Symbol Format - Page 1

Use this page format for each group of 4 to 7 symbols.

The purpose of this page format is to present:
- symbols and meanings.
- memory aids.
- directions for study.
- practice exercises.

Use TAEG Report #60, Use of Mnemonics in Training Materials: A Guide for Technical Writers, for help in creating memory aids.



- Learn to recall the rating of each badge.
- Use the memory aids to help you remember.

BADGES	MEMORY AIDS	RATINGS
	Propellers and other MACHINES repaired by MACHINISTS	Aviation Machinist's Mate (AD)
	Gears make TRAINING DEVICES move	Tradesman (TD)
	Bomb is handled by an ORDNANCEMAN	Aviation Ordnanceman (AO)
	Electrons in ELECTRONICS	Aviation Electronics Technician (AT)
	Orbiting electrons indicate OPERATOR in Antisubmarine Warfare	Aviation Antisubmarine Warfare Operator (AW)
	Arrow shows ASW sensors that look deep if TECHNICIAN keeps them working	Aviation Antisubmarine Warfare Technician (AX)

EXERCISE

- Complete this exercise.
- Use memory aids to recall each rating badge.
- Work quickly - think of answers rather than write them down.
- Look up the answer above only when needed.

- Keep practicing until you can name each rating badge quickly and correctly.
- For each new try, look at the badges in a different order - like backwards.

Modify directions for your type of symbol.

Select 4 to 7 symbols for this page. If you have more symbols, make additional pages.

Place similar symbols next to each other.

Place most difficult to remember symbols in the top or bottom position in list.

Make sure each symbol appears at least three times.

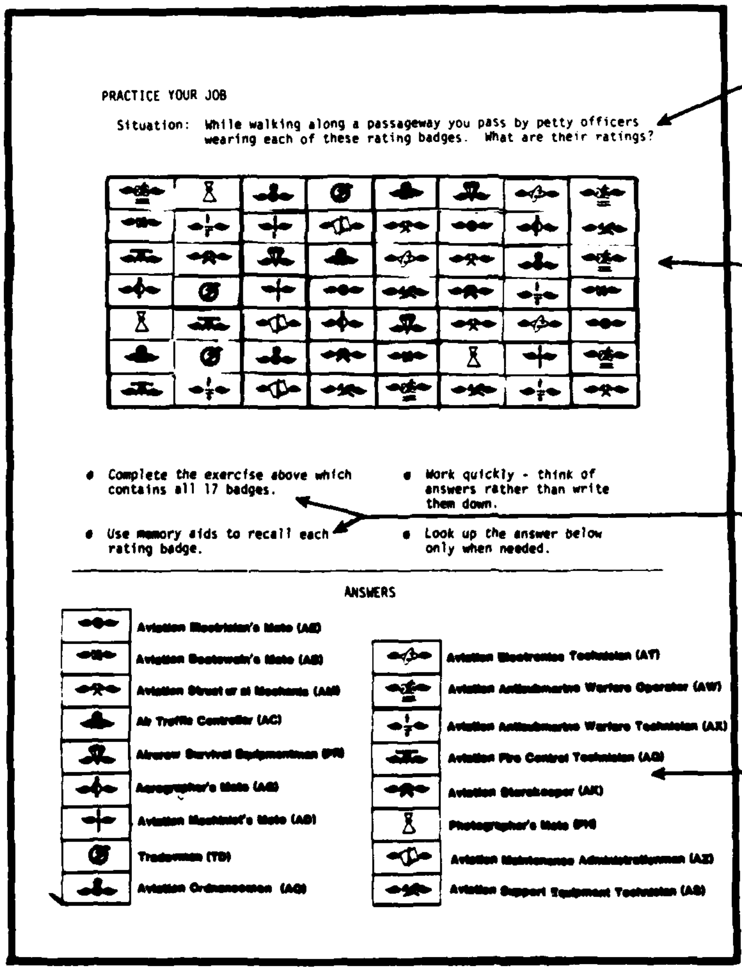
Directions should mention practice and change of order.

Symbol Format - Page 2

Use this page format for large exercises that combine the symbols from 3 smaller exercises based on page 1 of symbol format.

The purpose of this page format is to provide:
- directions for practice.
- repeated practice.
- presentation of answers.

Select about 20 symbols for this large exercise. Make sure some symbols from each of the preceding small exercises are included on this page. If you have more than 20 symbols, make additional pages.



PRACTICE YOUR JOB

Situation: While walking along a passageway you pass by petty officers wearing each of these rating badges. What are their ratings?

- Complete the exercise above which contains all 17 badges.
- Use memory aids to recall each rating badge.
- Work quickly - think of answers rather than write them down.
- Look up the answer below only when needed.

ANSWERS

Aviation Electrician's Mate (AE)
Aviation Boatswain's Mate (AB)
Aviation Structural Mechanic (AM)
Air Traffic Controller (AC)
Aircrew Survival Equipmentman (PR)
Aerographer's Mate (AG)
Aviation Machinist's Mate (AD)
Tradevman (TD)
Aviation Ordnanceman (AO)
Aviation Electronics Technician (AT)
Aviation Antisubmarine Warfare Operator (AW)
Aviation Antisubmarine Warfare Technician (AX)
Aviation Fire Control Technician (AQ)
Aviation Storekeeper (AK)
Photographer's Mate (PH)
Aviation Maintenance Administrationman (AZ)
Aviation Support Equipment Technician (AS)

Create a job-related scenario that calls for remembering the symbols.

Make sure each symbol appears at least three times.

Modify directions for your type of symbol.

Present answers in a logical order, if there is one.

System Descriptions and Nomenclature Format

A general format for use in designing training materials to teach names, locations, and functions of the various components of a system.

System Descriptions and Nomenclature Format - Page 1

Use this page format to give an overview of the entire system or that part of the system to be described next.

The purpose of this page format is to:
- **present high level system descriptions.**
- **name the major parts.**
- **point out the next part to be described in greater detail.**

INTRODUCTION

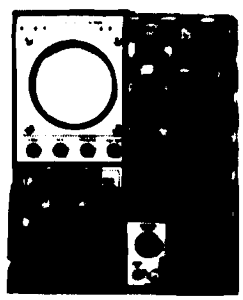
The oscilloscope is one of the most versatile pieces of test equipment available to the technician. It enables the technician to graphically display voltage, amplitude, shape, phase, and frequency of a waveform. This means that you can see a picture of what is actually taking place in the circuit that is being checked.

This module will present the names of various components of the oscilloscope, and their functions.

The specific scope used in this module is the Tektronix 545 B oscilloscope.

Put introduction on first page only

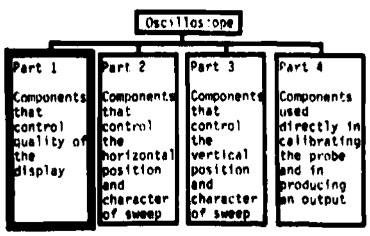
PART 1:
Components that control the quality of the display



Each of the knobs, switches, and displays included inside the marked area will be named and their functions described in the next few pages

Repeat this type page for each subsystem

Describe each subsystem



Note: The diagram to the left lets you see where you are in your study of the major components of the oscilloscope.

Make a bold line around subsystem to be presented next

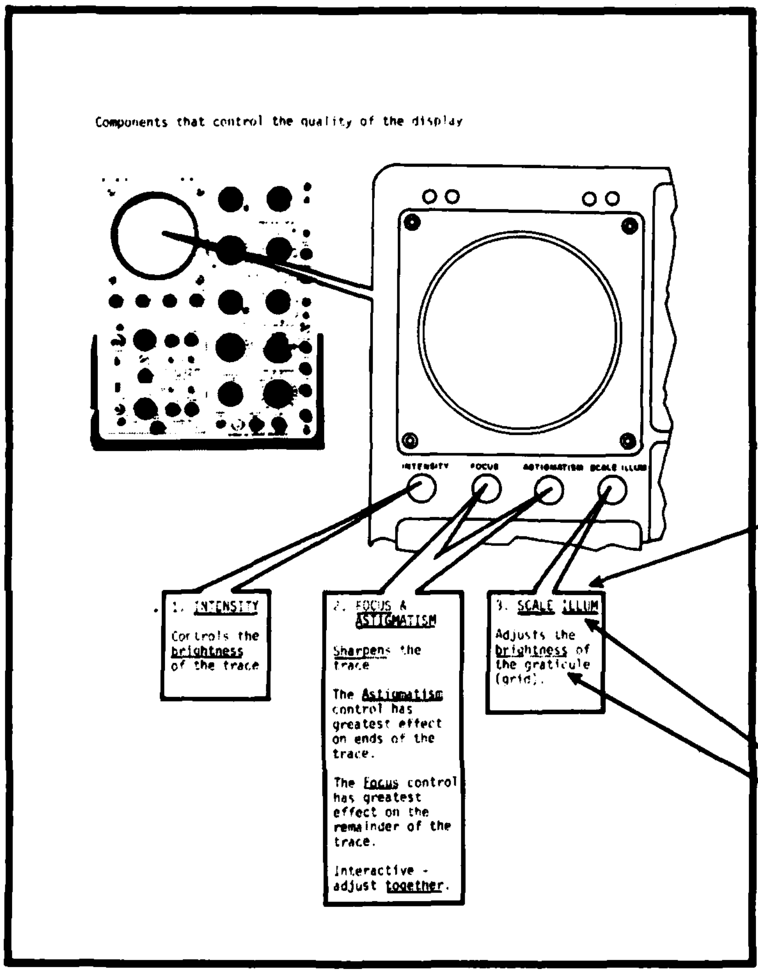
System Descriptions and Nomenclature Format - Page 2

Use this page format to present information on the components of that portion of the system under discussion.

The purpose of this page format is to present the components':
- **Names.**
- **Locations.**
- **Functions.**

Overview should generally be in upper left hand corner of page

Point dart from close-up to general location on the overview



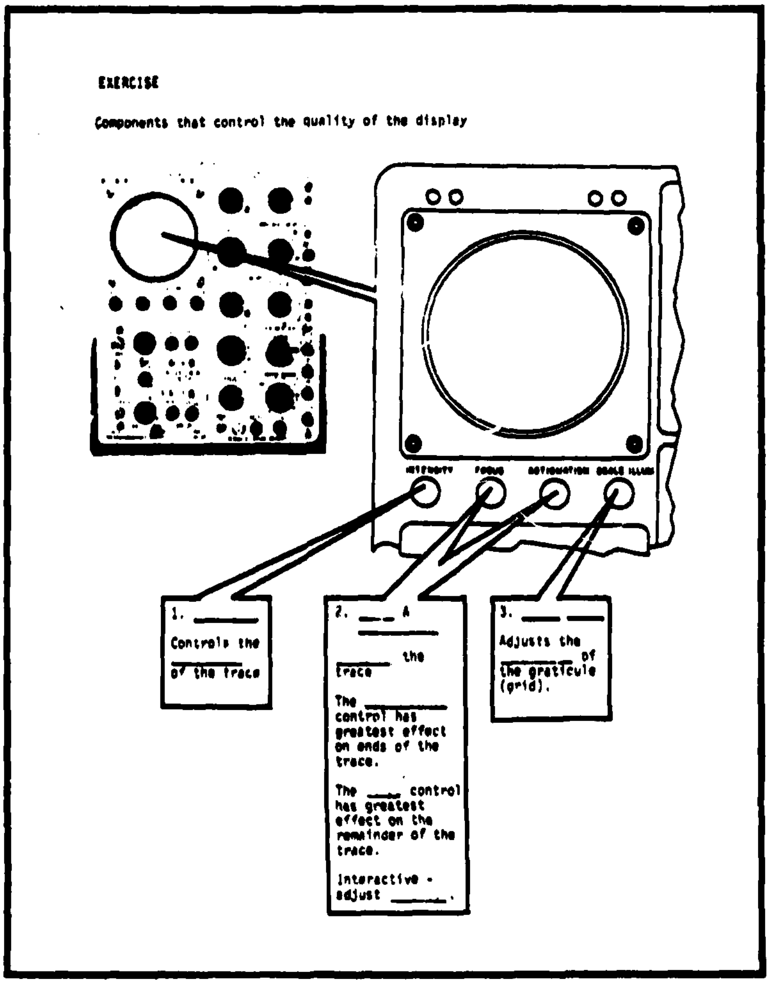
Place boxes so they appear in order -- left to right, right to left, or top to bottom

Present:
- *Name of component*
- *Function*

Use this page format immediately following each use of page 2 format.

The purpose of this page format is to:
- focus student attention on key words.
- provide students exercise in the recall of name, location, and function of each component when some cues are present.

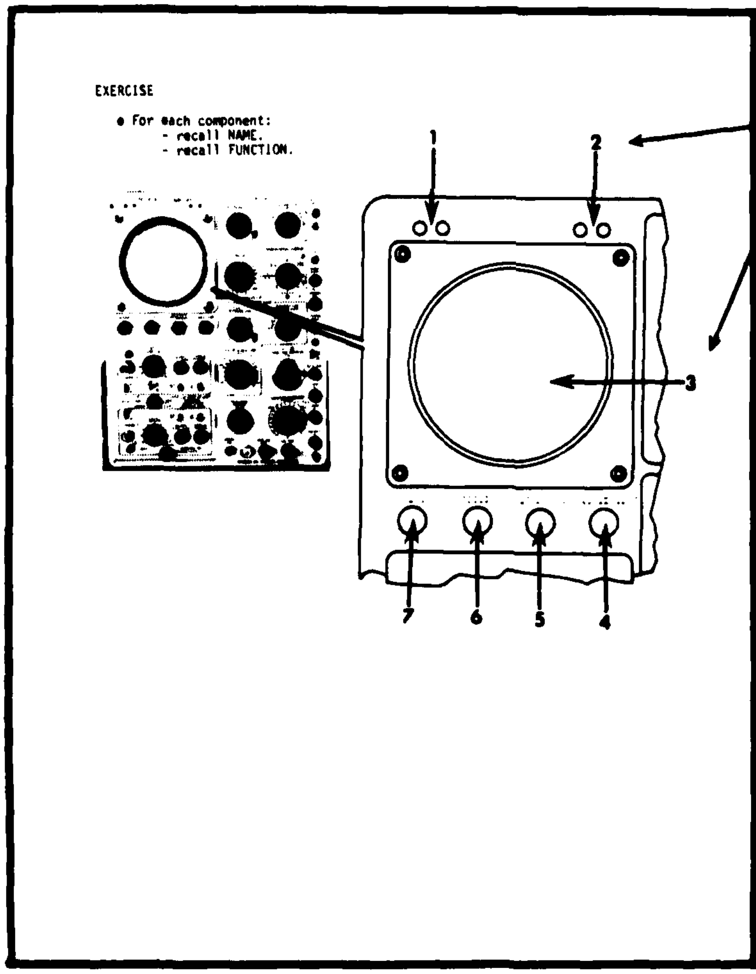
Copy the previous page. Then drop out key words that were underlined on the previous page.



System Description and Nomenclature Format - Page 4

Use this page format immediately after presenting all the components of that part of the system under discussion or after presenting 7 components, which ever comes first.

The purpose of this page format is to provide students exercise in recalling information about the components with no verbal cues present.



Number components in a clockwise manner

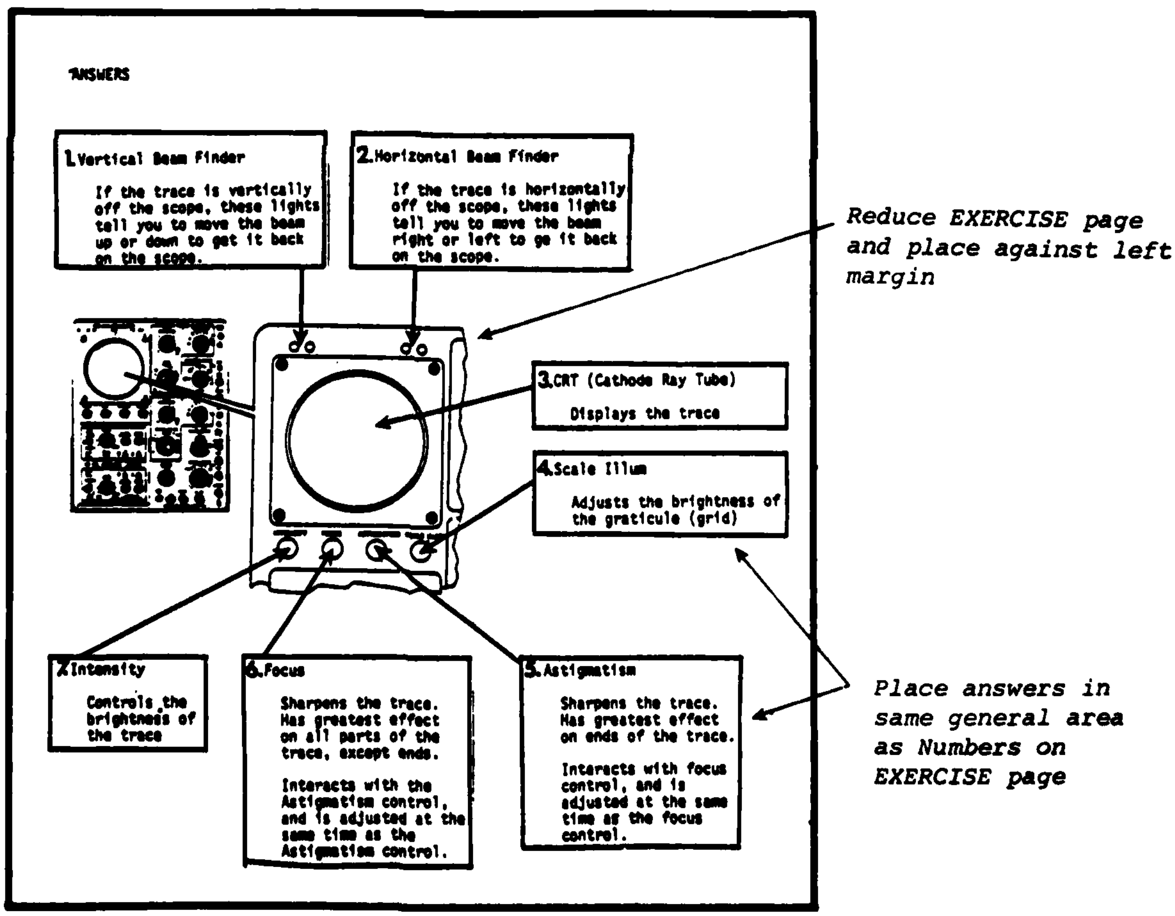
Use close-ups so that the components can be easily seen

Use line drawings or photographs

System description and Nomenclature Format - Page 5

Use this format immediately after each use of the page 4 format.

The purpose of this page format is to present the answers to the questions on the previous page.



Procedure Format

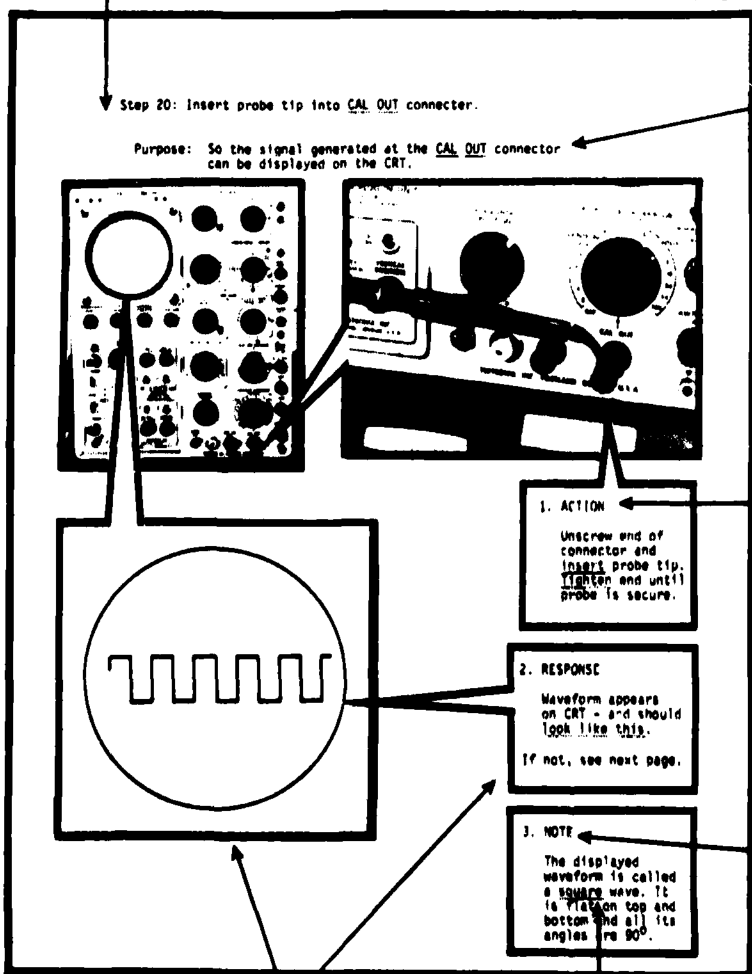
A general format for use in designing training materials which present steps of a procedure to be performed from memory.

Procedure Format - Page 1

Use this page format to present each step in a procedure.

The purpose of this page format is to present:
- **a word description of the step—emphasize human action.**
- **a visual display of the step—emphasize human action.**
- **the purpose of the step.**
- **the location of actions on equipment.**
- **the system response to actions taken.**
- **notes—additional needed information.**

Break procedure into logical steps. (Each step should start on a new page.)



Keep purpose short and simple.

Use line drawings or photographs.

If possible, each step should have no more than 3 or 4 actions.

State Action, and Response if there is one, and any Note. Number the boxes in the order you want them read.

Use notes to present additional information that must be recalled and used on the job.

If the system makes a response that should be noted or checked, present the response.

Underline key words.

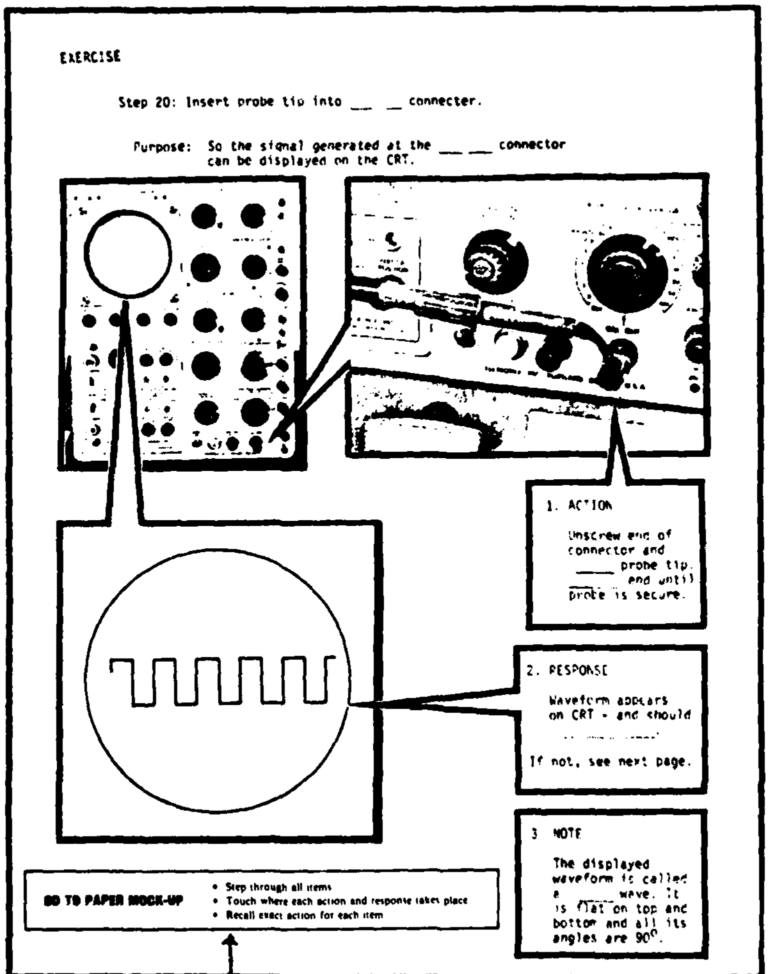
Keep pages simple, with no more than 3 or 4 boxes per page. Use additional pages if necessary.

Procedure Format - Page 2

Use this page format immediately following each use of the page 1 format.

The purpose of this page format is to:
- **provide students exercise in the recall of key words in the procedure.**
- **direct the students to practice the step on the paper mock-up.**

Copy the previous page. Then drop out key words that were underlined on the previous page.

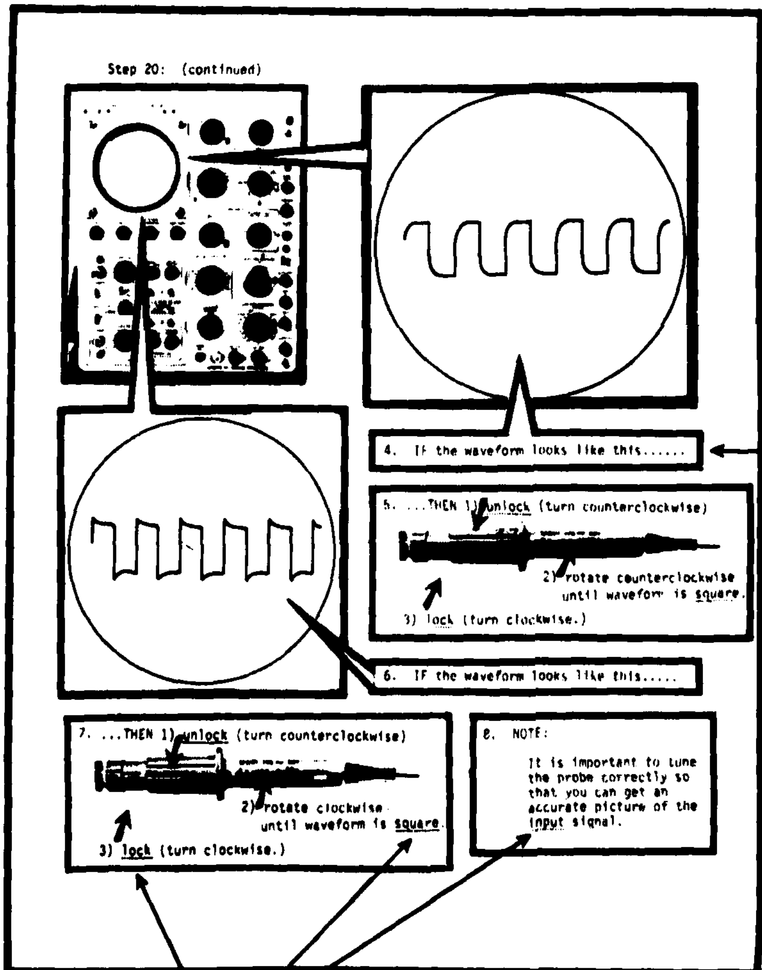


Add directions requiring students to go to the paper mock-up to practice the step.

Procedure Format - Page 3

Use this If/Then page to describe simple branches in a procedure.

The purpose of this page format is to:
- describe a special condition that changes the normal procedure.
- describe the action to respond to the special condition.



For any additional Responses and Actions, use the IF...THEN format.

Continue to underline key words.

Use this page after presenting each set of 3 to 7 steps in a procedure.

The purpose of this page is to provide directions for two types of exercises:
- with guides and prompts (arrows on "Roadmap").
- without guides and prompts (unannotated paper mock-up).

PRACTICE YOUR JOB

Directions:

FIRST
- With your finger, trace the flow of steps on the "Roadmap" on the next page.
- At each step, recall WHY (purpose) and HOW (action) to perform that step. Recall any system responses or notes.
- Check your answers if you feel they may be in error.
- Repeat this exercise until you can do it without error or hesitation.

THEN
- Go to the Paper Mock-up (foldout) and finger trace these same steps - this time without the road map to guide you.
- Remember locations, actions, and system responses.
- Check your answers if you feel they may be in error.
- Keep tracing until you do it smoothly, without having to look back, and without error.

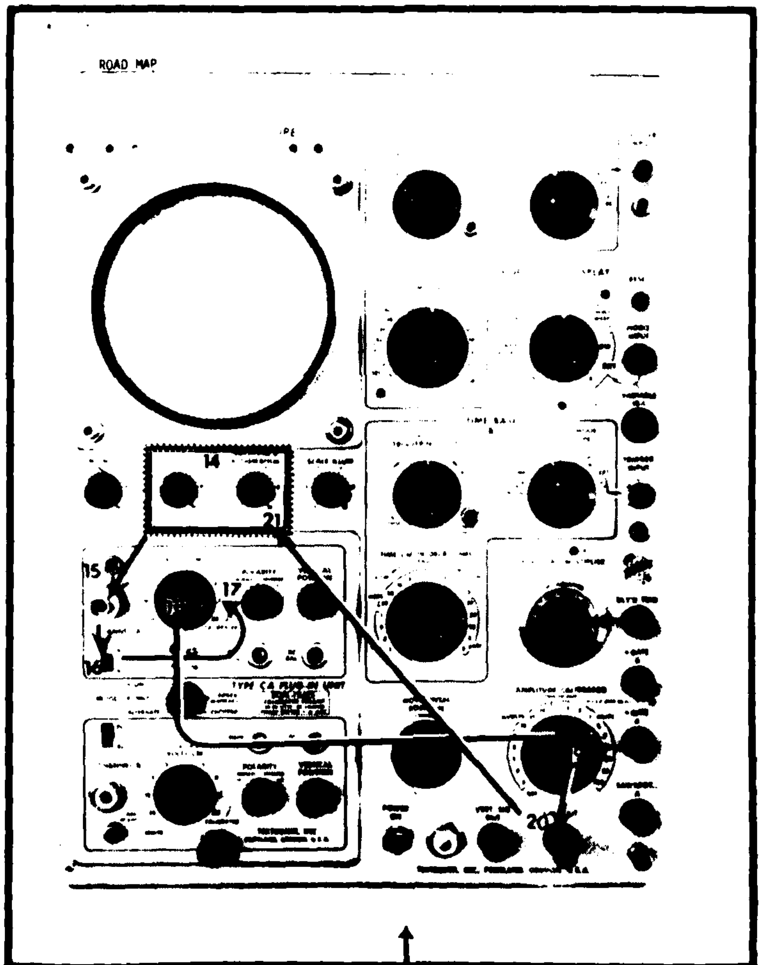
FINALLY
- Practice all 21 steps in this procedure on the Paper Mock-up.
- Keep practicing until you do it without error or hesitation.
- Check your answers if you feel they may be in error.
- Now, perform the procedure on the actual equipment.
- Repeat this practice (on the Paper Mock-up or actual equipment) every day for 1 week.

Use this text only after all steps in the procedure have been presented.

Use this page immediately after each use of the page 4 format.

The purpose of this page format is to provide a finger tracing exercise to aid students in recalling a sequence of steps.

For each cluster of 3 to 7 steps, present a Road Map showing how the steps are chained together.

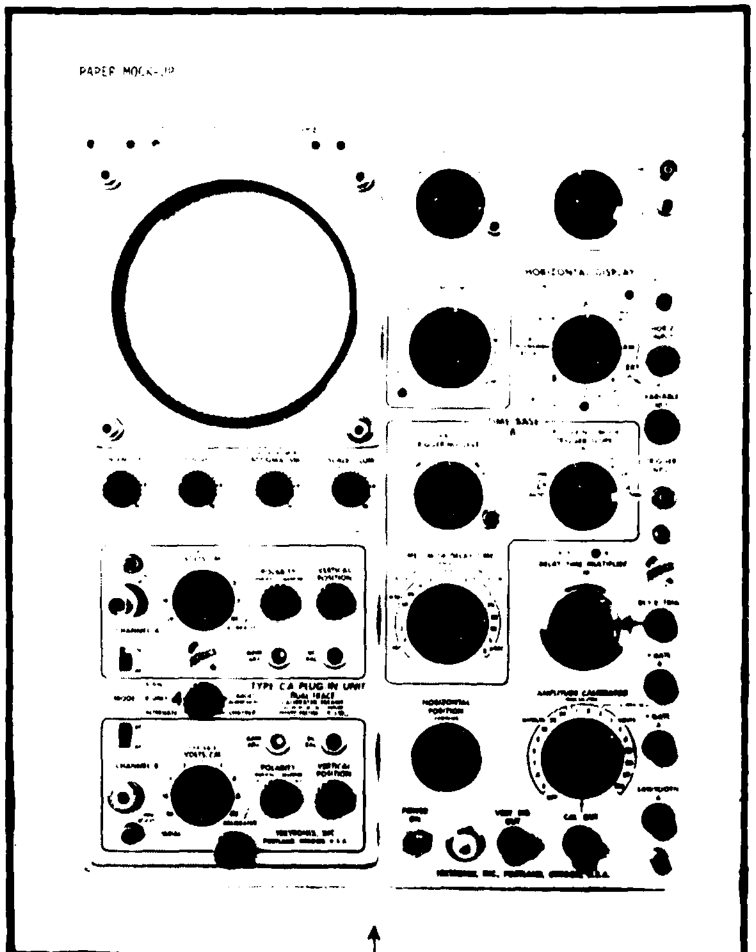


If the procedure is to be performed on the job with a checklist, present the checklist items here.

Procedure Format - Page 6

Use this type of page at the end of the learning module.

The purpose of this page format is to provide students with a way to practice one step, a set of steps, or all the steps in a procedure without the use of guides and prompts.



Make sure this page is a foldout that can be used at any time.

If the procedure is to be performed on the job with a checklist, present the entire checklist here, or on the opposite page where it can be easily seen while viewing this page.

Rules and Regulations Format

A general format for use in the designing training materials to teach the recall of rules, and the application of these rules in typical job situations.

Rules and Regulations Format - Page 1

Use this page format to present a rule.

The purpose of this page format is to:
- define the terms in the rule.
- present the rule.
- present a memory aid, if needed.
- show situations where the rule applies.
- show situations where the rule does not apply.

Give name of rule. *Give source of rule.*

RULE 27a, VESSELS NOT UNDER COMMAND......................NAVIGATION RULES CG-169

IMPORTANT TERMS:

terms	meanings	references
vessel not under command	Vessel through some exceptional circumstance is unable to keep out of the way of another vessel.	CG-169, p4, Rule 3(f)
underway	Vessel not at anchor, or made fast to the shore, or aground.	CG-169, p6, Rule 3(i)
making way	Vessel moving through the water.	

Define special terms used in rule - or needed to understand rule.

RULE: A vessel not under command shall exhibit two all round red lights in a vertical line where they can best be seen. When making way through the water, sidelights and a sternlight.

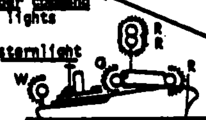
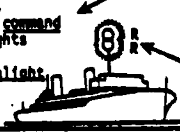
State the rule.

MEMORY AID: Vessel Not Under Command - Captain Dead Red over Red

Create a memory aid when the information to be recalled is easily confused with other memorized information. *

IMPORTANT: Make sure you can state this rule in your own words.

WHERE RULE APPLIES

typical situations	application of rule
Vessel: • underway • making way • rudder jammed	• rudder jammed: an equipment casuality, an exceptional circumstance. • therefore, vessel not under command - use 2 red all round lights • making way - use sidelights and sternlight 
Vessel: • underway • not making way • lost power	• lost power: an equipment casuality, an exceptional circumstance. • therefore, vessel not under command - use 2 red all round lights • not making way - no sidelights or sternlight 

Describe typical situations where the rule applies. Sample from the entire range of situations.

Use illustrations when they make clear the application.

WHERE RULE DOES NOT APPLY

Vessel: • not making way • fishing nets over side	• not an equipment casuality • therefore rule 27a does not apply
Vessel: • aground	• similar to an equipment casuality, but classified differently. Rule 27a does not apply

Describe the most common situations where individuals mistakenly think the rule applies.

Underline key words.

* *Use TAEG Report No. 60, Use of Mnemonics in Training Materials: A Guide for Technical Writers, for help in creating memory aids.*

Rules and Regulations Format - Page 2

Use this page format immediately following each use of the page 1 format.

The purpose of this page format is to:
- focus student attention to key words.
- exercise the students' recall of the meaning of the rule.

Copy the previous page. Then drop out key words that were underlined on the previous page.

EXERCISE

RULE 27a, VESSELS NOT UNDER COMMAND......................NAVIGATION RULES CG-169 -

IMPORTANT TERMS:

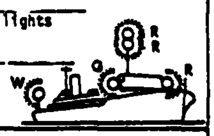
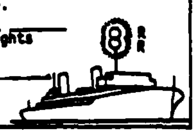
terms	meanings	references
vessel not under command	Vessel through some ________ ________ is ___ to keep out of the way of ________.	CG-169, p4, Rule 3(f)
underway	Vessel not at _____, or made fast to the _____, or aground.	CG-169, p6, Rule 3(i)
making way	Vessel _____ through the water.	

RULE: A vessel not under command shall exhibit two all round red lights in a ________ line where they can best be seen. When making way through the water, ________ and a ________.

> MEMORY AID: Vessel Not Under Command - ________ __ over __

IMPORTANT: Make sure you can state this rule in your own words.

WHERE RULE APPLIES

typical situations	application of rule
Vessel: • underway • making way • rudder jammed	• rudder jammed: an ________________, an exceptional circumstance. • therefore, vessel __ ________ - use 2 red __ ____ lights • making way - use ______ and ______ 
Vessel: • underway • not making way • lost power	• lost power: an ________________, an exceptional circumstance. • therefore, vessel ________ - use 2 red all round lights • not making way - no ______ or ______ 

WHERE RULE DOES NOT APPLY

Vessel: • not making way • fishing nets over side	• ___ an equipment casuality • therefore rule 27a does not apply
Vessel: • aground	• similar to an equipment casuality, but classified di ently. Rule 27a does not apply

Rules and Regulations Format - Page 3

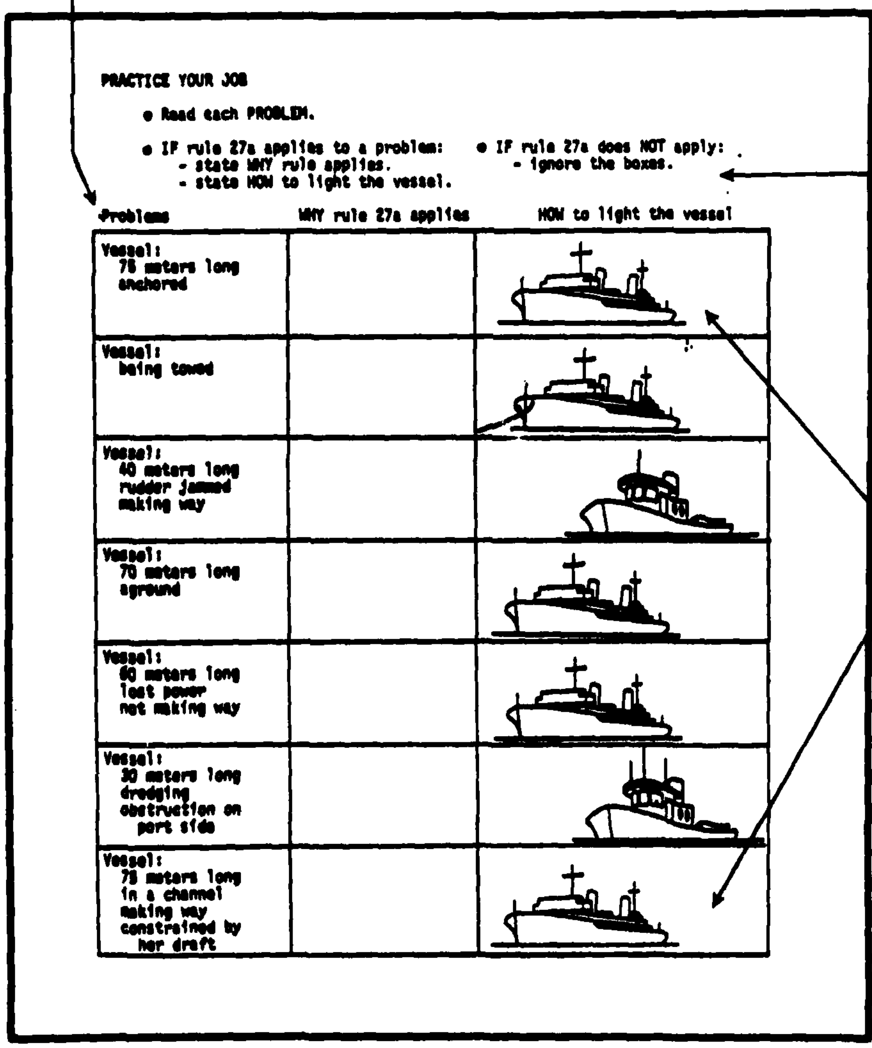
Use this page format immediately after presenting a rule (page 1) and exercising the recall of the rule (page 2).

The purpose of this page format is to present a number of examples which provide exercise in determining:
- situations where the rule applies.
- situations where the rule does not apply.

Present a list of job related problems where the rule applies and doesn't apply.

Modify the directions for your rule.

Create visual situations where the rule can be applied.



PRACTICE YOUR JOB

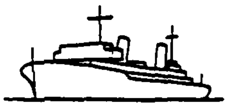
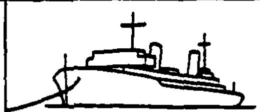
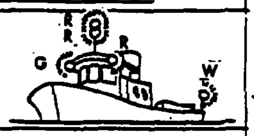
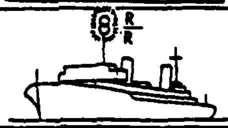
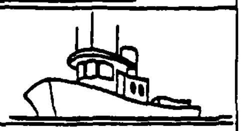
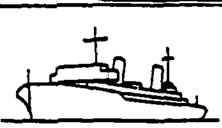
- Read each PROBLEM.
- IF rule 27a applies to a problem:
  - state WHY rule applies.
  - state HOW to light the vessel.
- IF rule 27a does NOT apply:
  - ignore the boxes.

Problems	WHY rule 27a applies	HOW to light the vessel
Vessel: 75 meters long anchored		
Vessel: being towed		
Vessel: 40 meters long rudder jammed making way		
Vessel: 70 meters long aground		
Vessel: 60 meters long lost power not making way		
Vessel: 30 meters long dredging obstruction on port side		
Vessel: 75 meters long in a channel making way constrained by her draft		

Rules and Regulations Format - Page 4

Use this answer page format immediately after presenting an exercise with page format 3.

The purpose of this page format is to:
- present answers to exercises.
- state directions for further practice, if needed.

Problems	WHY rule 27a applies	HOW to light the vessel
Vessel: 75 meters long anchored		
Vessel: being towed		
Vessel: 40 meters long rudder jammed making way	Rudder jammed; therefore, vessel not under command	
Vessel: 70 meters long aground		
Vessel: 60 meters long lost power not making way	Lost power; therefore, vessel not under command	
Vessel: 30 meters long dredging obstruction on port side		
Vessel: 75 meters long in a channel making way constrained by her draft		

Record correct answers in those instances where the rule applies.

If you missed any answers, go back and study the rules and then repeat the exercise. Change the order that you look at the problems.

Present this direction on last answer page for exercise.

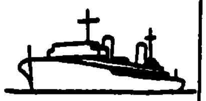
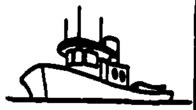
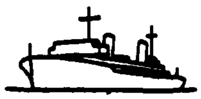
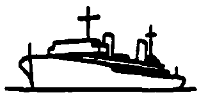
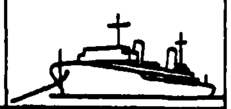
Rules and Regulations Format - Page 5

Use this page format after presenting a set of up to 6 related rules using page formats 1, 2, 3, and 4.

The purpose of this page format is to give the student an opportunity to exercise selection of the correct rule in typical job situations, and to exercise correct applications of the rule.

PRACTICE YOUR JOB

- Name the rule that applies.
- State WHY it applies.
- State HOW to light the vessel.

Problems	Which rule applies, and WHY?	HOW to light the vessel
Vessel: 60 meters long lost power not making way		
Vessel: 70 meters long aground		
Vessel: 30 meters long dredging obstruction on port side		
Vessel: 75 meters long in a channel making way constrained by her draft		
Vessel: 75 meters long anchored		
Vessel: being towed		
Vessel: 40 meters long rudder jammed making way		

Use more pages if necessary to present a range of problems for each of the rules.

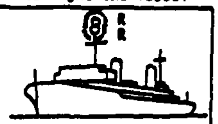
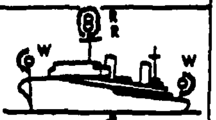
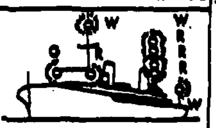
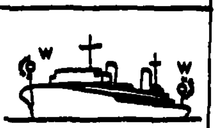
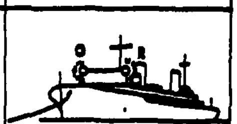
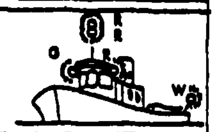
Rules and Regulations Format - Page 6

Use this page format immediately following each use of the page 5 format.

The purpose of this page format is to provide answers to the rule applications exercise.

PRACTICE YOUR JOB

ANSWERS

Problems	Which rule applies, and WHY?	HOW to light the vessel
Vessel: 60 meters long lost power not making way	Rule 27; Vessels not under command. Lost power. -2 red all-round lights	
Vessel: 70 meters long aground	Rule 30; ...Vessels aground. 50+ meters - anchor lights -2 red all-round lights.	
Vessel: 30 meters long *dredging* obstruction on port side	Rule 27d ...dredging -3 all-round lights (red, white, red) -2 all-round lights each side; obstruction side = red; other = green	
Vessel: 75 meters long in a channel making way constrained by her draft	Rule 28; Vessels constrained by draft. -running lights -3 all-round red lights	
Vessel: 75 meters long anchored	Rule 30; Anchored vessels. 50+ meters -1 all-round light forward -1 all-round light in stern	
Vessel: being towed	Rule 24; Towing and pushing. Vessels being towed: - sidelights - sternlight	
Vessel: 40 meters long *rudder jammed* making way	Rule 27; Vessels not under command. Rudder jammed: - 2 all-round red lights making way: - side and sternlights	

REPEAT THIS EXERCISE UNTIL YOU CORRECTLY APPLY THE APPROPRIATE RULE TO EACH PROBLEM.

Present this direction on last answer page for exercise.

Classifications Format

A general format for use in designing training materials to teach the recognition of signals on equipment displays, or the recognition of objects or conditions in typical job situations.

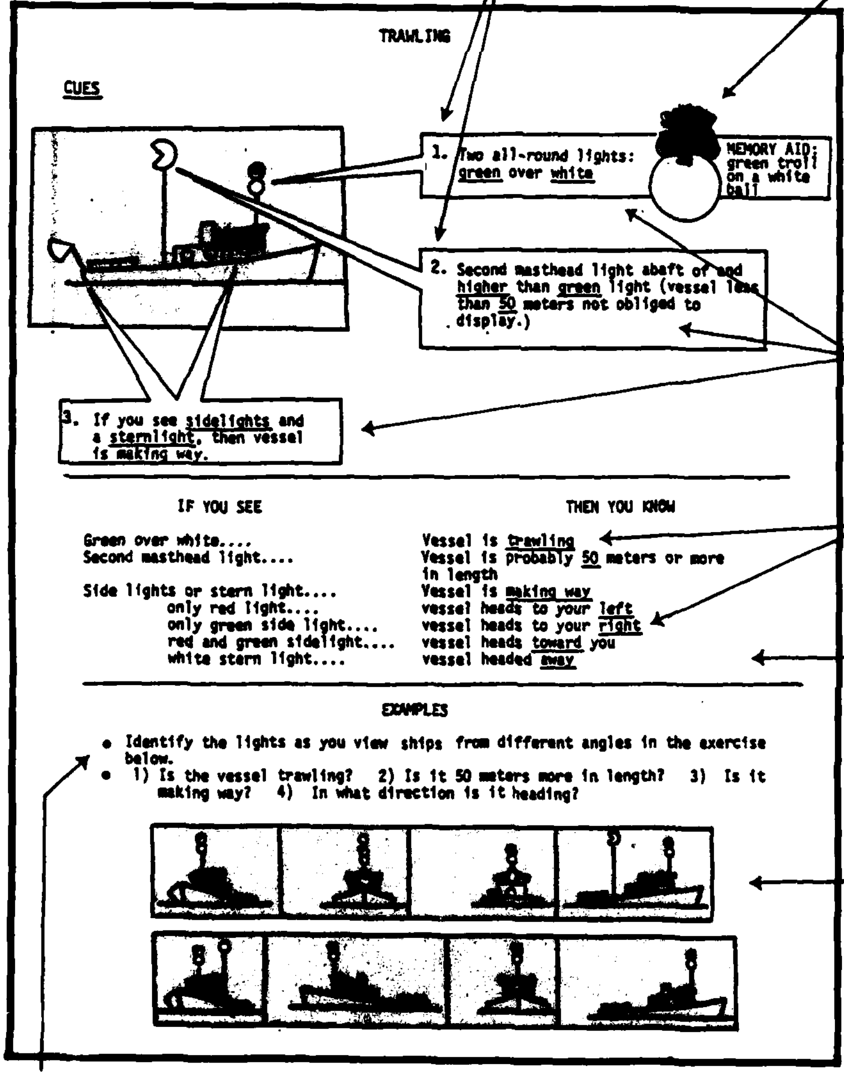
Classifications Format - Page 1

Use this page format to initially present the cues used in recognizing and classifying a specific type signal, object or condition. A page like this is created for each different class to be recognized.

Present boxes in the order you want them read. Number them.

Create memory aids when the information to be recalled is easily confused with other memorized information.

Use TAEG Report No. 60, Use of Mnemonics in Training Materials: A Guide for Technical Writers, for help in creating memory aids.



Present just those cues that are used in classifying the object or event.

Underline key words.

Create self-directions; i.e., easily remembered rules as guides in classifying.

Make sure you illustrate each of the conditions listed above in "IF YOU SEE, THEN YOU KNOW."

Modify the directions for your type of classifying task.

Classifications Format - Page 2

Use this page format immediately following each use of the page 1 format.

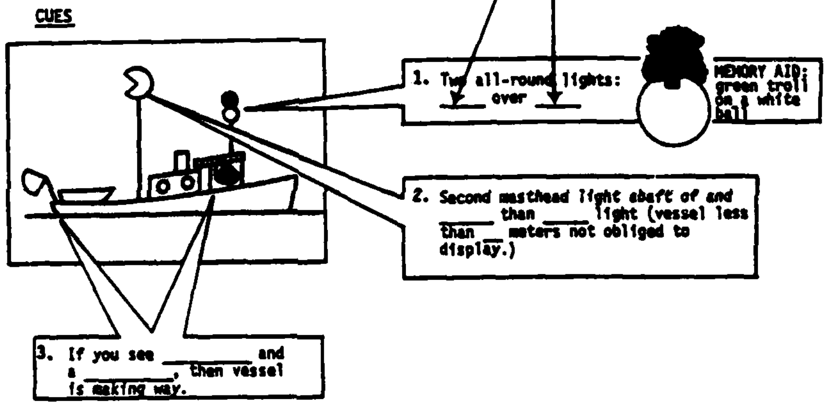
The purpose of this page format is to:
- **focus student attention on key words.**
- **provide students exercise in the recall of classifying cues.**

Copy the previous page which presents how to classify an object or event; then drop out key words that were underlined on the previous page.

EXERCISE

TRAWLING

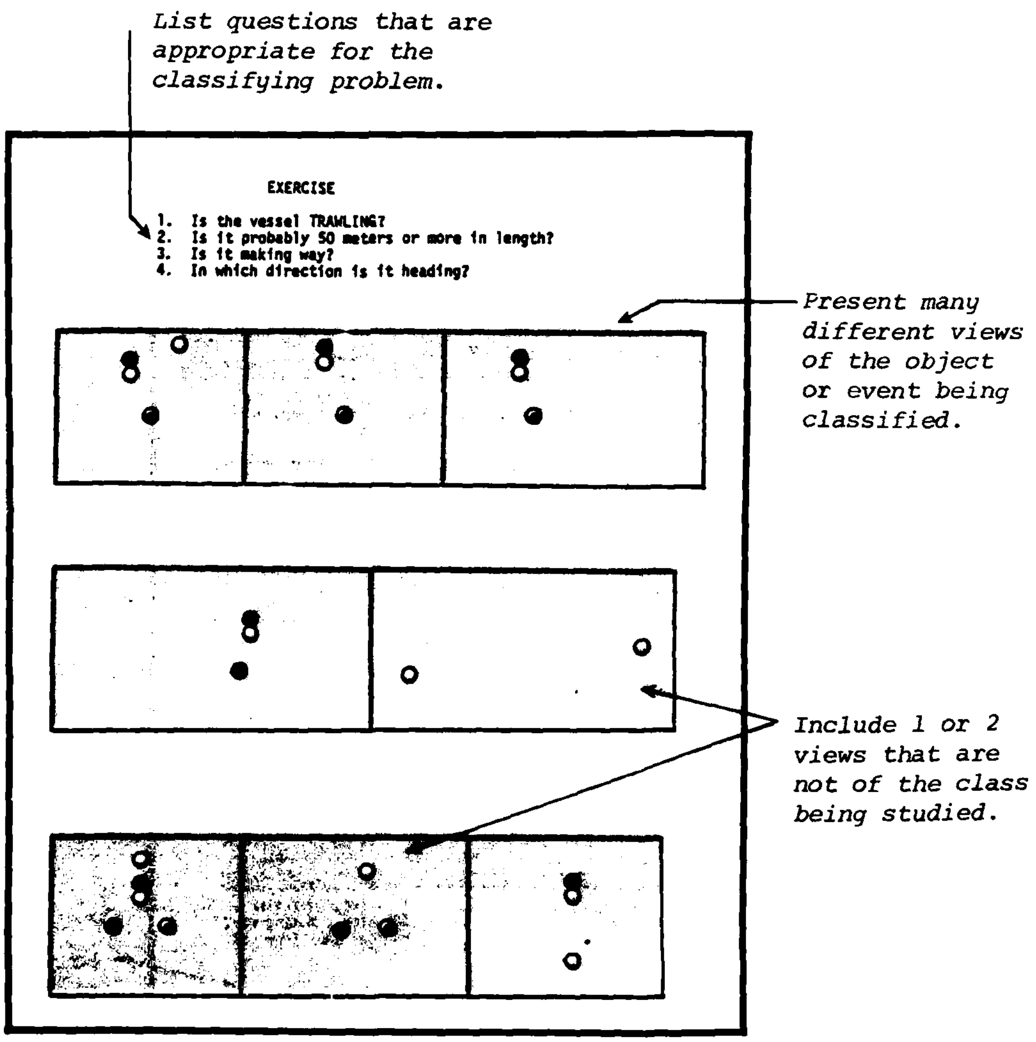
CUES



IF YOU SEE	THEN YOU KNOW
Green over white....	Vessel is ___
Second masthead light....	Vessel is probably __ meters or more in length
Side lights or stern light....	Vessel is ___
only red light....	vessel heads to your ___
only green side light....	vessel heads to your ___
red and green sidelight....	vessel heads ___ you
white stern light....	vessel headed ___

Use this page format immediately following each use of the page 2 format.

The purpose of this page format is to:
- present examples of a single class of signals, objects or conditions to be classified.
- exercise the students in using the classifying cues to recognize instances of a single class of signals, objects or conditions.



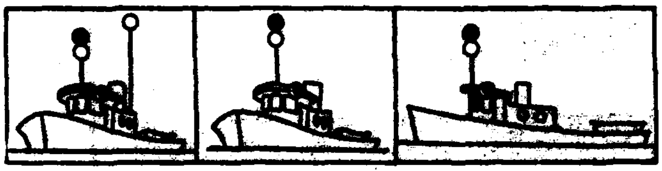
Classifications Format - Page 4

Use this page immediately following each use of the page 3 format.

The purpose of this page format is to present the answers to the exercise presented with the page 3 format.

Copy the exercise page, and add the answers. Where possible, annotate or enhance the image to make the correct answer more apparent.

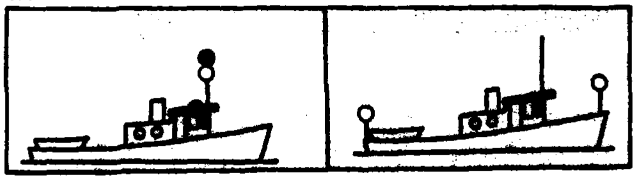
ANSWERS



Trawling, probably 50 meters or more, making way, heading to your left

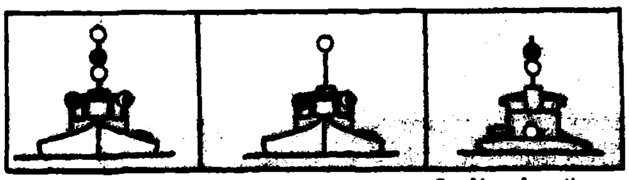
Trawling, less than 50 meters, making way, heading to your left

Trawling, less than 50 meters, making way, head to your left



Trawling, less than 50 meters, making way, heading to your right

Not trawling



Trawling, probably 50 meters or more, making way, heading toward you

Not trawling

Trawling, less than 50 meters, making way, heading away from you

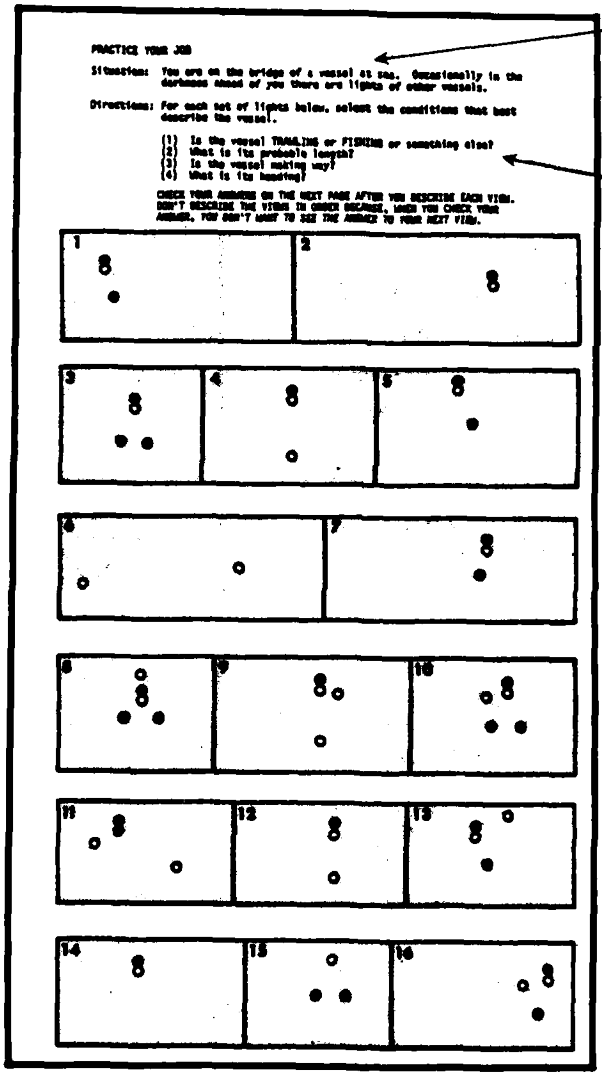
IF YOU MISSED ANY ANSWERS, GO BACK AND STUDY THE CUES AND MEMORY AIDS. THEN REPEAT THE EXERCISE, CHANGING THE ORDER THAT YOU LOOK AT THE VIEWS.

Present directions stressing repetition and changing order.

Use this page in two situations:
(1) after using page 1,2,3, and 4 formats with two classes.
and
(2) after using page 1,2,3 and 4 formats with all (or a major set of classes.

The purpose of this page is to present two types of exercises:

- Pair Exercises - to exercise the students in recalling the cues and using them in recognizing instances of two classes.
- Large Exercises - to present similar exercises covering many separate classes.



Create a scenario of a job situation in which the skill will be required.

Create directions to your classification task.

Select a broad range of views from earlier exercises. Add new views. Present views in a random order.

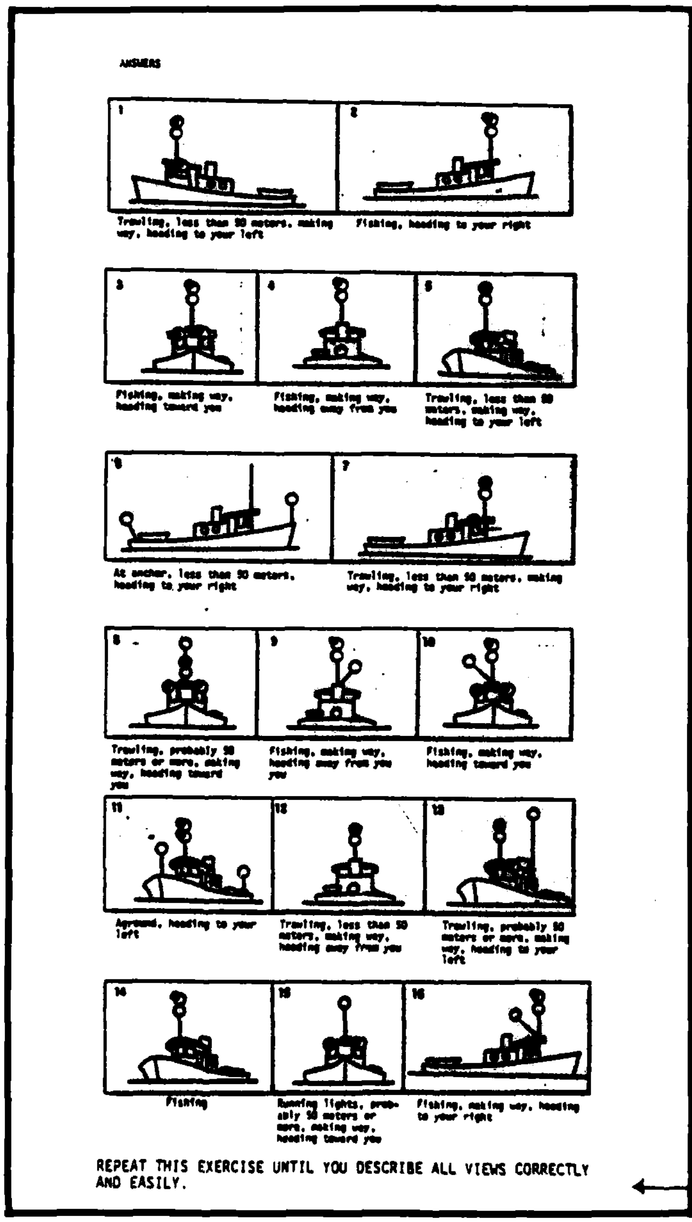
Use more pages if necessary to present a range of views of all objects or events being classified.

Classifications Format - Page 6

Use this page immediately after the use/each instance of the page 5 format.

The purpose of this page is to present the answers to the exercise presented with the page 5 format.

Place an answer page immediately following each practice page.


ANSWERS

1 Trawling, less than 50 meters, making way, heading to your left

2 Fishing, heading to your right

3 Fishing, making way, heading toward you

4 Fishing, making way, heading away from you

5 Trawling, less than 50 meters, making way, heading to your left

6 At anchor, less than 50 meters, heading to your right

7 Trawling, less than 50 meters, making way, heading to your right

8 Trawling, probably 50 meters or more, making way, heading toward you

9 Fishing, making way, heading away from you you

10 Fishing, making way, heading toward you

11 Aground, heading to your left

12 Trawling, less than 50 meters, making way, heading away from you

13 Trawling, probably 50 meters or more, making way, heading to your left

14 Fishing

15 Running lights, probably 50 meters or more, making way, heading toward you

16 Fishing, making way, heading to your right

REPEAT THIS EXERCISE UNTIL YOU DESCRIBE ALL VIEWS CORRECTLY AND EASILY.

Copy the exercise page, and add the answers. Where possible, annotate or enhance the image to make the correct answer more apparent.

Present this direction on last answer page for exercise.

3.1.5 Specify the Course Instructional Delivery System

The procedures in this section involve the specification of an instructional delivery system which provides the most efficient and effective combination of instructional methods to accomplish the terminal objectives prescribed in Section 2.1. Basically, the delivery system is the method used to package and present the instruction to students. Since there is no single best method of instruction which applies to all instructional objectives, the delivery system will normally include a combination of learning strategies, training devices, and a system of organizing students and instructor to accomplish all learning objectives in the course. Group-paced and self-paced instruction are two broad categorized delivery systems commonly used in Navy training programs. Each uses a different combination of instructional media, training devices, physical facilities, etc. Definitions of group-paced and self-paced instruction are provided in the next paragraphs.

- GROUP-PACED INSTRUCTION (Also called Lock-Step). Group-paced instruction is delivered in sequence and paced to suit the progress of the majority of the class. All students in the class (group) progress through the instruction at the same rate. Slower learners normally have trouble keeping up with such a rate when it is geared to the average learner. Faster learners are slowed down.

- SELF-PACED INSTRUCTION. Self-paced instruction is instruction in which students of different aptitudes can progress through an instructional program at their own rate. This enables slower students to take more (but not unlimited) time for additional study and practice. Faster students can finish more quickly.

The question here is, "Which delvery system is best; group-paced, self-paced, or a combination of the two?" This selection must be made on the basis of careful analysis of the training requirements from several standpoints: (1) the categories of learning objectives from Section 3.1.2, (2) the learning strategies for learning objectives from Section 3.1.4, (3) the student population, (4) facilities and equipment required and available, and (5) development time available and costs.

Following is some additional guidance for selecting the delivery system.

1. How long do you have to develop and implement the course? Self-paced materials take more time to prepare than group-paced materials.

2. Are architectural changes necessary? If they are needed in order to go self-paced, does the implementation date allow time for the construction?

3. Are additional personnel needed? Self-paced instruction often requires more personnel to run efficiently. This is because labs and learning centers must be manned frequently to allow students access when they need it. If additional personnel are required, consider whether these additional resources could be obtained within the time-frame allotted.

4. How do/will the staff accept the delivery system? If the staff feels the delivery system is a poor one, chances are it will fail. The staff should be educated as to the benefits of each delivery system and involved in the decision making process.

5. What student grouping patterns are called for? If the learning objectives require large amounts of team training, group-paced instruction is appropriate. If the objectives are oriented to printed materials, individual audiovisual lessons, individual labs, and the like, self-pacing could be a more effective delivery system.

6. How frequently is instructional material revised? Material which undergoes frequent changes is probably best taught in a group-paced mode. Changes to self-paced instruction are costly.

7. How many students go through the course at a given time? If large numbers of students go through a course, it is possible to make self-paced materials cost efficient. At the same time, if only two or three students are ever available at one time to take a course, it, too, may best be taught self-paced since an instructor could conceivably monitor that course and another simultaneously.

3.2 CURRICULUM OUTLINE AND INSTRUCTIONAL MANAGEMENT PLAN

3.2.1 Curriculum Outline

The Curriculum Outline serves as a planning/approval document for development of specific training materials to be used to conduct a course of instruction. Curriculum Outlines are used by the curriculum developer to organize the course of instruction and to ensure that all required subject matter is adequately covered in the course. For higher authority, they serve as a valuable course control document for initial approval, quality control, and standardization. For training activities, an approved Curriculum Outline serves as the official plan of instruction for conducting training.

A Curriculum Outline consisting of pertinent course and student data (Front Matter) and a complete listing of Unit/Modules and Lesson Topic Titles in their sequential order with the learning objectives (terminal and enabling) which they support, will be submitted to higher authority for review and approval prior to the development of course materials (subject matter).

A complete Curriculum Outline consisting of the approved Curriculum Outline and all Annexes prescribed in this manual will be completed by the developer and submitted to the cognizant [illegible] commander prior to validation, with [illegible].

3.2.1.1 Elements of the Curriculum Outline. The basic elements of the curriculum outline consist of the Front Matter, the Outline of Instruction, and the Annexes.

. FRONT MATTER. The front matter for the curriculum outline consists of the following:

Cover: The following items will be included on the cover. (An example is shown in Figure III-6.)

1. The complete title, with no abbreviations, of the name of the document and the course for which the curriculum outline is being prepared.

2. The name and address of the course curriculum developer.

3. The course identificaton number (CIN) assigned.

4. The name and address of the curriculum approval authority.

5. The curriculum outline preparation date. If this is a revision, the date of the previous document should be in parenthesis under the date of the current document.

6. Appropriate classification markings.

Table of Contents: The table of contents for the curriculum outline will include (an example is provided in Figure III-7):

1. Front Matter

   Cover
   Course Data Page
   Student Data Page
   Foreword

2. Outline of Instruction (in sequence)

CURRICULUM OUTLINE

FOR

INTERIOR COMMUNICATION ELECTRICIAN (IC)

CLASS "A" SCHOOL

Prepared by

Naval Education and Training Support Center, Pacific

San Diego, CA 92132

A-623-0012

Prepared for

Chief of Naval Education and Training

Naval Air Station Pensacola

Pensacola, FL 32508

AUGUST 1980

(March 1978)

Figure III-6.--Sample Cover Page for Curriculum Outline.

TABLE OF CONTENTS

Figure III-7.--Example of Table of Contents Page for Curriculum Outline

Course Data Page: The following items will be included on the Course Data Page (an example is shown in Figure III-8):

1. Course mission statement.

2. Security classification: Specify highest security classification of instructional materials. Indicate if foreign nationals are restricted from any portion of the course.

3. Estimated course length in contact periods and calendar days for group-paced courses and courses which are primarily group-paced, or an estimated average completion time for self-paced courses.

4. Course Curriculum Model Manager (if appropriate).

5. Locations at which the course will be taught. The full address for each location will be listed.

6. a. Student capacity per classroom or learning center for which course is designed.

b. Maximum loading capability per class for group-paced courses or input per week for self-paced courses.

7. Staffing (instructor and support requirements) based on planned student input per week.

8. Curriculum Approval Authority.

9. Quota Control (the specific desk, office or command title).

COURSE DATA PAGE

1. COURSE MISSION: To provide Hospital Corpsmen (E1-E9) with advanced training in diving medicine. This includes in-depth study of the anatomy and physiology of the human body as it relates to diving; neurological examination; the effects of pressure on the human body; the prevention, diagnosis, and treatment of compressed gas diseases; and the operation of the hyperbaric recompression chamber.

Upon completion of this course, the Hospital Corpsman is prepared for assignment with a Naval Special Warfare Team or a Fleet Marine Force Reconnaissance Unit to provide medical coverage and treatment of diving medical disorders in all Naval Special Warfare and Fleet Marine Force Reconnaissance operational environments.

2. SECURITY CLASSIFICATION: Unclassified.

3. COURSE LENGTH: 2 weeks; 80 contact periods.

4. COURSE CURRICULUM MODEL MANAGER: Naval Diving and Salvage Training Center
Panama City, Florida 32407

5. LOCATIONS AT WHICH TAUGHT: Naval Amphibious School
Coronado, San Diego, CA 92155

6. STUDENT CAPACITY: a. Per Learning Center under normal load: 10
b. Per Learning Center under maximum load: 10

7. STAFFING REQUIREMENTS: 7 instructors, 4 support personnel

8. CURRICULUM APPROVAL AUTHORITY: Chief of Naval Technical Training

9. QUOTA CONTROL: Naval Amphibious School, Coronado, San Diego, CA 92155

10. PLANNED IMPLEMENTATION DATE: 20 January 1981

11. PRIMARY MODE OF INSTRUCTION Group-paced

12. INSTRUMENTS AND PROCEDURES FOR MEASURING STUDENT PERFORMANCE: Written criterion referenced tests and performance tests. All objectives will be met with 100% accuracy.

13. DATE OF PRECEDING CURRICULUM OUTLINE: May 1977

14. PERSONNEL QUALIFICATION STANDARDS (PQS): 4325.108; 4325.111; 4325.114-4325.127.

Figure III-3.--Sample Course Data Page for a Curriculum Outline.

10. Planed course implementation date.

11. Primary mode of instruction (group-paced, self-paced, etc.).

12. Instruments and procedures for measuring student performance.

13. Date of preceding curriculum outline (for course revisions).

14. Personnel Qualification Standards (PQS) met by the course.

Student Data Sheet: The following items will be included on the student data sheet (example shown in Figure III-9).

1. Personnel physical requirements.

2. Security clearance required.

3. Prerequisite training and/or ASVAB scores required.

4. Personnel and rating eligible.

5. Obligated service.

6. NOBC/NEC earned upon completion of course.

7. Related and/or follow-on training.

8. Units/modules and lesson topics specified for the rating (to be included if personnel attending are assigned specific lessons rather than the entire course because of rating or follow-on training requirements; BE and E is an example).

Foreword: The foreword (Figure III-10) is a statement of the purpose and interpretation of the contents of the curriculum outline.

STUDENT DATA SHEET

1. PERSONNEL PHYSICAL REQUIREMENTS: All students must pass a standard Navy entrance physical and have normal color perception.

2. SECURITY CLEARANCE REQUIRED: No security clearance is required upon entry into Interior Communication Electricians Class "A" School.

3. PREREQUISITE TRAINING: All students must satisfactorily complete Modules 1-25 of Basic Electricity and Electronics School.

4. PERSONNEL AND RATING ELIGIBLE: IC graduates of Basic Electricity and Electronics School.

5. OBLIGATED SERVICE: None.

6. NOBC/NEC EARNED: None.

7. RELATED AND FOLLOW-ON TRAINING: None.

Figure III-9.--Example of a Student Data Sheet.

FOREWORD

This document was prepared for submission to higher authority for approval. The curriculum outline lists course lesson topics and associated learning objectives, both terminal and enabling, in their sequential order. Unless otherwise stated, the standard for achieving
7 each of these objectives is 100%.

In some Units of Instruction, specifically Metering and Indicating, Ship's Control and Navigation, the lessons are designed around a system. As a result, there are several lessons on operating principles and circuit operation which are enabling lessons to troubleshooting. To show these relationships, all terminal objectives will be listed for the system. Enabling objectives will then follow by lesson numbers.

Satisfactory completion of this course should not be construed as meeting all the PQS for the systems taught. Selected PQS items may be signed off at the discretion of the school; however, in all cases the responsibility for final qualification of an individual with respect to proficienc on the equipments or sysems as they apply to a particular ship rests with the Commanding Officer. It is recommended that individual Commanding Officers consider satisfactory completion of the course as contributing toward making qualification decisions.

Figure III-10.--Example of a Foreword for a Curriculum Outline.

3.2.1.2 OUTLINE OF INSTRUCTION. The outline of instruction will be sequenced in the order in which the instruction is to be presented and will include the following (an example of a Unit/Module page is presented in Figure III-11; a Lesson Topic page example is presented in Figure III-12):

1. Unit/Module or Lesson Topic number and complete title. Units, modules, or both units and modules may be used to identify major sections of a course. Whichever system is used, it should be consistent throughout the course. Modules will be numbered consecutively throughout a unit.

Examples:

UNIT/MODULE NUMBER

- Units and Modules

  UNIT ONE Module 3 1st unit, 3rd module

- Unit or Module

  4.0 4th unit or module

LESSON TOPIC NUMBER

- 1.5 1st Unit/Module, 5th Lesson Topic

Definitions of Units, Modules, and Lesson Topics are provided in Section 3.5 for Group-Paced instruction and Section 3.6 for Self-Paced instruction.

2. Contact periods: classroom/learning center and laboratory (if appropriate) listed separately. For self-paced courses, this item would be average contact periods (e.g., Average Contact Periods: Learning Center - 5.2 Laboratory - 1.1).

3. Media.

OUTLINE OF INSTRUCTION

Module 6: Alarm, Safety and Warning

Contact periods: Classroom - 4.6 Laboratory - 1.0

Media: Lecture with transparencies

Security Classification: CONFIDENTIAL

Terminal Objective:

Completely supported by this module:

29.0 Given alarm switchboard (IC/S), associated contact makers, audible alarms and a system schematic, the student will be able to troubleshoot the alarm, safety and warning system by following the Navy 6-step troubleshooting procedures and isolating single faults to the circuit and components level. (JTI Task No. TCB-01).

Figure III-11.--Example of a Module Page of a Curriculum Outline.

OUTLINE OF INSTRUCTION

Lesson Topic 6.2: Types of Faults and Their Causes

Contact periods: Classroom - 2.6

Media: Lecture with transparencies

Terminal Objective 29.0

Supported in part by this lesson topic:

29.0 Given alarm switchboard (IC/S), associated contact makers, audible alarms and a system schematic, the student will be able to troubleshoot the alarm, safety and warning system by following the Navy 6-step troubleshooting procedures and isolating single faults to the circuit and components level. (JTI Task No. TCB-01).

Enabling Objectives:

Completely supported by this lesson topic:

29.3 Given a schematic of the alarm system and a set of statements, identify the types of faults that can occur in the supervisory circuit, alarm circuit and trouble buzzer circuit.

29.4 Given a set of symptoms, a system schematic, and a set of statements identify probable causes of a malfunction in the alarm, safety and warning system.

29.4.1 Given a list of visual and audible indicators and a set of statements, identify a trouble, alarm, or normal condition.

Figure III-12.--Example of a Lesson Topic Page of a Curriculum Outline.

4. Security classification of lesson if other than unclassified.

5. Listing of all terminal and/or enabling objectives supported partially or totally in the Unit/Module or Lesson Topic. Each objective should be listed with the appropriate identification number assigned in Section 2.1.3.3. Once numbered, Terminal Objectives and Enabling Objectives will retain their respective numbers throughout. These numbers have no relationship with the Unit/Module or Lesson Topic number.

Examples:

10.0 10th Terminal Objective

9.3.1 9th Terminal Objective; Enabling Objective; 1st level further breakdown of 3rd Enabling Objective.

6. For each terminal objective and enabling objective (if appropriate), the number(s) of the JTI task statement(s) which the objective suports will be listed.

. ANNEXES. The following annexes will be included in the curriculum outline in the order presented here:

Annex A. Equipment Requirements List: A list of training devices, audiovisual equipment, tools, classroom and laboratory equipment (file cabinets for test storage, work benches, etc.) supplies (spare bulbs, test answer sheets, etc.) will be included. An example of an Equipment Requirements List is provided in Figure III-13.

Annex B. Training Materials List: A list of all training materials used in the course. All transparencies, films, slides, sound/slide programs, audio cassettes, video tapes, and military and commercial publications used to develop instruction will be listed. An example is provided in Figure III-14.

Annex C. Skills Profile: Unless otherwise exempted, a Skills Profile will be developed for the course. The format for the skills profile is established by separate CNET directive.

Annex D. Master Course Schedule: A schedule of instruction shall be prepared for each course. The schedule will list the topic number and title for each period of the day. The periods will be numbered consecutively for the length of the course but divided by day and week. For each period the student-to-instructor ratio will be listed. See Figure III-15 for an example of a Master Course Schedule.

ANNEX A

EQUIPMENT REQUIREMENT LIST

NOMENCLATURE	TYPE DESIGNATOR OR DEVICE NUMBER	NATIONAL STOCK NUMBER	QUANTITY	PER ITEM COST
Multimeter, Simpson 260		6625-01-021-0236	70	116.00
Stool, 30 inch		9Q-7110-00-194-1611	30	34.32
Rebber Matting, Safety, Electrical Diamond Tread		9Q-7220-00-254-4240	5 RL.	74.88
Tape, Masking		9Q-7510-00-266-6709	10 RL.	.52
Precision Decade Resistance Box	CAG-1433T	4G-6625-00-840-4256	12	268.00
Cell Test Resistors (Beckman)		1H-99-LL-HDE-M577	8	81.00
Probe, Electrical Safety Shorting		9N-5920-01-029-4176	10	23.38
Portable Live Pressure Tester		9G-6685-821-0798	2	1501.87

Figure III-13.--Example of an Equipment Requirements List for a Curriculum Outline.

ANNEX B

Training Materials List

NUMBER (MIL PUBS)	TITLE	QTY.
NAVSHIPS 0965-022-2010	Type G Telephone Set	20
NAVSHIPS 0965-LP-074-4010	Amplifier, Audio Frequency AM-2210 G/WTC	20
NAVSHIPS 0901-650-0002	Naval Ships Technical Manual Chpt. 9650, Interior Communications Installations	20
NAVSHIPS 0965-000-7000	Alarm Switchboard Type IC/S	20
NAVSHIPS 0965-074-5010	Synchro-Signal Amplifier, Types E & F	20
NAVSHIPS 324-0301	Dead Reckoning Systems, Dead Reckoning Analyzer Mk 6 Mod 1, Dead Reckoning Tracer Mk 6 Mod 4	20
NAVSHIPS 365-2644	Interior Communications Switchboards, Types I & II	6
NAVSHIPS 0965-049-9010	Alarm Switchboard Type IC/SM	20
NAVSHIPS 9062-02	Rectifier Power Supply, Bogue Model 6153	2
NAVSHIPS 365-2623	Underwater Log Equipment, Electromagnetic Type for 40-knot Equipment, Litton	20
NAVSEA 0965-LP-073-8010	Underwater Log Equipment, Electromagnetic Type Mk 4 Mod 1 - Chesapeake	20
NAVSEA 0365-LP-280-4010	Wind Indicating Equipment, Type F	20
NAVSHIPS 324-0460	Ships Course Indicator Type E	20
NAVSHIPS 365-2883	Salinity Indicating System	20
NAVSEA 0349-LP-058-2000	High Pressure Class A Air Compressor	20
NAVSHIPS 365-2477	Propeller Revolution Indicating Equipment	20
NAVSHIPS 365-2427	Ships Control Consoles	20
NAVSHIPS 365-2739	Technical Manual for Intercommunication Stations LS-386A/SIC	20

Figure III-14.--Example of Training Materials List for a Curriculum Outline.

ANNEX D

MASTER COURSE SCHEDULE

Operational Hours: 0700-1530
Length of Period: 50 min.

Week 1

Topic No.	Type	Period	Topic	Ratio
First Day				
0.0	Class	1	Course Overview	10/1
1.1	Class	2 3	Anatomy and Physiology, Diving	10/1
1.2	Class	4 5 6 7 8	Diving Disorders, Primary Effects	10/1
Second Day				
1.3	Class	9 10 11 12	Diving Disorders, Secondary Effects	10/1
1.1 2	Class	13	Introduction to Recompression Chamber	10/1
1.13	Lab	14 15 16	Recompression Chamber Operations	2/1
Third Day				
1.13	Lab	17 18 19	Recompression Chamber Operations	2/1
1.10	Class	20	Hyperbaric Treatment Tables	10/1
1.8	Class	21 22	Neurological Examination	10/1
1.8	Lab	23 24	Neurological Examinations	2/1
Fourth Day				
1.10	Class	25	Hyperbaric Treatment Tables	10/1
1.8	Lab	26 27 28 29	Neurological Examinations	2/1
1.1	Lab	30 31 32	Recompression Chamber Operations	2/1
Fifth Day				
1.8	Lab	33 34 35	Neurological Examinations	2/1
1.6	Class	36	Oxygen Toxicity	10/1
1.5	Class	37	Near Drowning	10/1
1.1,1.2, 1.3,1.10, 1.12,1.13	Class	38 39 40	Examination	10/1

Figure III-15.--Example of Master Course Schedule for a Curriculum Outline.

3.2.2 The Instructional Management Plan

The Instructional Management Plan (IMP) defines the procedures for administering and managing the instruction. Among other items included, it delineates policy on student setbacks and remediation as well as describes the instructor qualification program and facilities requirements.

The Instructional Management Plan is to be completed and submitted to the curriculum approval authority prior to validation. An Instructional Management Plan will be developed and kept current for all courses within the NAVEDTRACOM.

3.2.2.1 Elements of the Instructional Management Plan. The basic elements of the Instructional Management Plan are the Cover, Course Management Data, Student Flow Management Data, and Instructor Qualification Program.

. COVER. The following items will be included on the cover. (An example is provided in Figure III-16.)

1. The complete title of the document, with no abbreviations, and the course for which the instructional management plan is being prepared.

2. The name and address of the instructional management plan developer.

3. The course identification number (CIN).

4. The name and address of the course approval authority.

5. The instructional management plan preparation date. If this is a revision, the date of the previous document should be in parenthesis under the date of the current document.

6. Appropriate classification markings. The developer should strive to make this document unclassified. A course that contains classified material does not automatically have a classified instructional management plan.

INSTRUCTIONAL MANAGEMENT PLAN

FOR

INTERIOR COMMUNICATION ELECTRICIAN (IC)

CLASS "A" SCHOOL

Prepared by

Naval Education and Training Support Center, Pacific

San Diego, CA 92132

A-623-0012

Prepared for

Chief of Naval Education and Training

Naval Air Station Pensacola

Pensacola, FL 32508

AUGUST 1980

(March 1978)

Figure III-16.--Sample Cover Page for Instructional Management Plan.

. COURSE MANAGEMENT DATA. As a minimum, the following items are to be included in the course management data. Other data may be included at the discretion of the developer:

1. Staff requirements (i.e., the minimum number of instructors, by assignment, including night study and phase supervisors; support staff required for such areas as equipment maintenance and clerical; and course managers and supervisors). Both military and civilian personnel should be specified.

2. Facilities requirements (i.e., configuration of laboratories and classrooms).

3. Alternative plan for handling other than planned student input should be included. Such items as any revisions in course sequence, equipment, or facilities usage and course length should be addressed.

In addition to the above items, the following would be addressed, if applicable:

1. Multiple shifts: If students move from one shift to another as part of the normal progression in the course, any transition or off time between shifts should be identified. If the normal sequence of instruction must be altered to meet special messing schedules, this should also be noted.

2. Student movement outside the primary instructional environment. Describe transportation arrangements, berthing and messing arrangements, etc.

3. Security requirements. If the course contains classified equipment or information, describe how equipment and information will be handled so that security is not compromised.

4. Foreign nationals. If foreign nationals are restricted from portions of the course, the lesson topics affected and the procedures for managing their movement should be specified.

5. Computer Managed Instruction. Describe student movement and test scoring procedures to be followed during periods of CMI system downtime.

. STUDENT FLOW MANAGEMENT DATA. The Student Flow Management Data will include a description of policy for actions affecting student pipeline movement: (1) GRADUATION, (2) remediation, (3) setback to another class within the same course (group-paced courses only), and (4) dropped from training for academic or suitability reasons. The policies set forth shall be in accordance with appropriate functional command directives. The plan shall specify procedures for retesting students after remediation, the number of retests allowed, when the student must meet the Academic Review Board (ARB), and the options available to the board. A student flow diagram (See Figure III-17) may be included if desired.

. INSTRUCTOR QUALIFICATION PROGRAM. The Instructor Qualification Program will describe how instructors will be qualified to teach in the course after completion of appropriate formal instructor training. It will describe a specific program for each instructor/staff position. For example, a laboratory instructor may only need to be qualified on certain parts of the course while a supervisor needs to be familiar with the entire course. Instructors are to be evaluated for qualification in their initial assignments (laboratory or classroom). Reassignment to another phase of training or learning environment would require a new qualification evaluation. The process for conducting the evaluation will also be specified in the Instructional Management Plan.

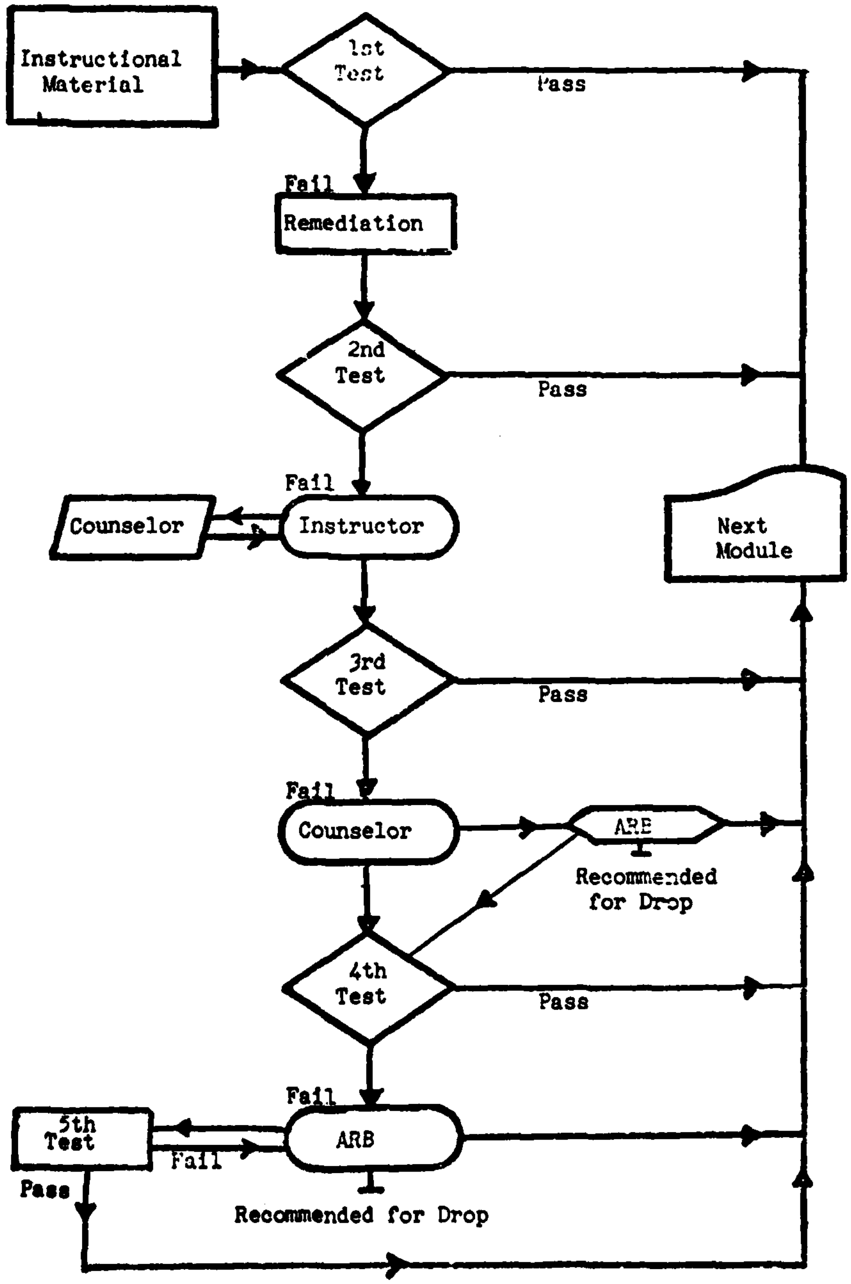


Figure III-17.--Student Flow Diagram

3.3 COLLECT, EVALUATE, AND RETAIN ADEQUATE EXISTING COURSE MATERIALS

The purpose of this section is to locate, evaluate, and retain for use as many existing instructional materials as possible. For years the Navy has taught everything from basic cake decorating to nuclear arc welding. Lectures, films, textbooks, programmed instructions, and other materials have been developed to teach the myriad of skills and knowledge needed to keep the Navy afloat. With careful examination and selection, some of these materials may be used in courses other than those for which they were originally designed. If instructional materials can be found that teach the course objectives, they should be used.

3.3.1 Collect Existing Instructional Materials

Instructional material is defined as all items of material used to get information across to students. This includes instructor guides, transparencies, posters, pictures, job performance aids, sound-slide programs, films, and textbooks. Note that this definition does not specify that the material must have been developed using a systems approach to course design. All that is being considered is the instructional material itself. If the instructional material addresses similar subject matter as your objective(s), then consider it.

Existing instructional materials should be considered from three standpoints: those that can be placed into the course as they are; those that require some modification; and those that can be used as resource material but otherwise do not fit into the course. Using existing course materials in these ways saves money, expedites the curriculum development effort, and allows for development of a quality course that uses a variety of strategies to enable learners to achieve course goals.

3.3.1.1 Sources of Course Materials. There are a variety of sources which should be considered:

. EXISTING COURSES. Many of the course development efforts are actually revisions to existing courses. If this is the case, review existing course materials such as instructor guides, student guides, student study booklets, films, sound-slide programs, posters, transparencies, and laboratory, study, and student activity sheets.

. OTHER DOD COURSES. Other branches of the Navy, as well as the Army, Air Force, and Marine Corps offer courses containing materials which may be useful for the course design effort. The instructional materials from these courses which support similar objectives should be reviewed. Key documents which may be useful in locating such courses are formal schools catalogs, catalogs of correspondence, extension courses, and indexes of standard/doctrinal publications for departmental (service wide) level publications.

Formal Schools Catalogs. Each service has a formal schools catalog which lists all courses offered by that service. This catalog can be used as a guide to find out if a course exists on a given topic; then, training literature can be requested. In general, the catalog lists the course number and title, location, course length, purpose and scope, prerequisites, and quota control agency for each formal school and course of instruction offered by the service. School catalogs for the services are listed below:

NAVY	NAVEDTRA 10500 (series), Catalog of Navy Training Courses
MARINE CORPS	Marine Corps Order P1500.12, Formal Schools Catalog

AIR FORCE	Air Force Manual 50-5, USAF Formal Schools Catalog
ARMY	Department of Army Pamphlet 351-4, Formal Schools Catalog

. Correspondence/Extension Courses. A Nonresident Career Course (NRCC) is a self-study enlisted training course held outside of the formal school setting. It is locally administered and usually self-scored. These courses are taken by persons who want to develop and enhance their Navy careers. Each branch of the service has a catalog which identifies nonresident career courses offered.

. Standard/Doctrinal Publications. These publications are written at headquarters or staff level. They define the basic principles and doctrines by which military forces and support persons act in support of national objectives. These publications are listed in headquarters level indexes. Although they are not specifically designed for training, they may be useful in certain training settings.

These are the three major sources for locating existing courses and their supporting instructional materials. Look over the catalogs from these sources or talk with officials from a service schools command or staff. If certain instructional materials are appropriate, then request the material from the appropriate activity. In the request, identify the instructional material needed by title and number, if possible, the number of copies needed, the reason for the request, and the address where the materials should be sent.

Besides courses offered through the Department of Defense, courses offered through civilian agencies, i.e., vocational schools, colleges and universities, high schools, adult education programs, to name a few, should be reviewed.

3.3.1.2 Sources of Instructional Materials. Thus far, the discussion has concerned sources for locating existing courses and their supporting instructional materials. However, there are a variety of sources for instructional materials themselves, not necessarily found by looking for a specific course. These sources may be very useful when materials for specific objectives have not been located by looking through course catalogs. These sources and the types of instructional materials they might provide are:

NAVAL EDUCATION AND TRAINING SUPPORT CENTERS (NETSC). These centers, located in San Diego and Norfolk, house many activities, such as film libraries and media development facilities. The media department catalogs and keeps a copy of each transparency, slide, drawing mockup, and diagram they make. Films kept in the film library are also cataloged. Given a specific topic, the NETSC's may be able to identify materials such as those described above which could be useful. Then a formal request for materials would be made via the functional command.

NAVAL PHOTOGRAPHIC CENTER (NPC). This center, located in Washington, D.C., has hundreds of thousands of photographs on many, many subjects: weapons, missiles, aircraft, ships, electrical equipment, military dress, to name but a few. NPC could identify some possibly useful photographs.

NAVAL TRAINING EQUIPMENT CENTER (NTEC). The Naval Training Equipment Center, located in Orlando, Florida, develops many training devices for all branches of service. A catalog which lists and describes each training device developed is available for review.

INSTRUCTIONAL PROGRAM DEVELOPMENT CENTERS (IPDC). These centers, located in San Diego (NETSCPAC), Great Lakes, Pensacola, Norfolk (NETSCLANT), and Memphis, are primarily

responsible for development of specific courses as tasked by Chief of Naval Education and Training. To support their curriculum development efforts, they may have an instructional media department, an evaluation department, as well as an instructional program development department. As with the NETSC's, the IPDC's instructional media department catalogs and keeps copies of all materials they develop. Copies may be requested from the IPD's for review.

DEFENSE AUDIOVISUAL INFORMATION SYSTEM (DAVIS). This computer-based system catalogs audiovisual material for ALL branches of the service. Information can be retrieved by title or subject. The NETSC's, the IPDC's, and many functional commands have access to DAVIS terminals and can conduct a catalog search upon request.

There are many other sources for locating existing instrctional materials. Check with the functional commands and appropriate warfare sponsors for suggestions.

3.3.2 Evaluate Existing Instructional Materials

When potential existing materials have been collected, they must be evaluated to determine if some or all of their content is usable in the course under development or revision.

The evaluation process begins by reviewing the materials objective-by-objective, or by groups of related objectives. Be sure to locate and review all parts of a particular lesson. In printed materials, related parts may not be located together. For example, practice may be in a separate workbook, or at the end of a chapter. For lectures, films, etc., the entire presentation may have to be reviewed. Instructor guides, lecture notes, or film scripts may help in finding all of the parts.

The following criteria should be used to judge the adequacy of existing instructional materials.

3.3.2.1 Learner Characteristics. The materials accepted must match the learner characteristics of students in the course under revision or development. Academic scores, aptitude scores, special skills, reading ability, etc., which the students need to handle the material, must be similar to the qualifications of the students who will use them in the new or revised course. If the material is close to what is needed and revision is possible, then choose it, but if too extensive a revision is required, it is better to reject the material.

3.3.2.2 Delivery System. Examine the materials to determine whether they conform to the delivery system in Section 3.1.5. For example, if the method of instruction selected is Traditional Lecture in a group-paced course, then a programmed instruction could only be used as an adjunct and not as the main method of instruction. The closer a delivery system is to what you have chosen, the better. However, in many cases, if the subject matter is similar, media like programmed instructional texts or written narratives can be converted into a lecture presentation or vice versa.

3.3.2.3 Unit/Module Lesson Topic Format. Even if instructional materials fit the student characteristics and selected delivery system perfectly, they may be unsuitable because they fail to fit the unit/module, lesson topic format identified in the curriculum outline. That is, the materials may be too extensive in some areas and/or not extensive enough in others. If the materials are not extensive enough, consider the feasibility of adding the necessary detail. For example, if Module 39 on solid state wideband amplifiers is selected from the Air Force's Individualized Electronics Principles Course, but it lacks the depth of coverage needed, it will be easier to add to the module to provide the necessary coverage than to start from the beginning. If the material is more extensive than

needed, it might be possible simply to cut out unnecessary parts. Sometimes, this will require a complete revision of the material so that it may be easier to start from the beginning and develop new material.

3.3.2.4 Adequate Presentation of Instruction. Existing materials will still be unsuitable if they do not present the instruction using the most effective learning strategy identified in Section 3.1.4. Failure to use the best learning strategy can reduce efficiency and increase training time, attrition rates, instructor requirements, etc. Since this is the most critical and difficult aspect of selecting and modifying existing materials, curriculum developers should use the following guidelines for assistance.

GUIDELINES FOR DETERMINING PRESENTATION ADEQUACY

In Section 3.1.4, the most effective and efficient learning strategies were determined for each knowledge and performance objective in the Curriculum Outline. Then the required "lesson components" for each learning strategy were determined based upon the category of objective (knowledge or performance). Now, when evaluating existing materials for adequacy, it is important to ensure that: (1) the lesson materials for each objective use the correct learning strategy; (2) that the required lesson components are present; and (3) that each component is adequately presented. Use the following guidelines for this purpose:

ENSURING THE CORRECT LEARNING STRATEGY AND LESSON COMPONENTS

Following are two examples of how this is done for both knowledge and performance objectives (Section 3.1.4 provides additional guidance regarding each example):

Example 1. Knowledge Objectives. When an objective requires students to recall or recognize information, then the learning strategy in the existing material should contain the following lesson components:

- LEARNING OBJECTIVES covered by the lesson.
- INTRODUCTION.
- A STATEMENT of the information to be remembered and one or more memory aids to assist learners in recalling or recognizing the information.
- Adequate PRACTICE in recalling or recognizing the information.
- PRACTICE FEEDBACK which is immediate and provides a complete answer to the item.

Example 2. Performance Objectives. When an objective requires students to perform a job-related task by applying a rule, regulation, procedure, or classification scheme, the learning strategy in the existing material should contain the following lesson components:

- LEARNING OBJECTIVES covered by the lesson.
- INTRODUCTION.
- A concise STATEMENT of the procedure, rule, or classification scheme which students must use, followed by an explanation and guidance on how to apply it.
- Enough EXAMPLES to cover all applications of the rule, regulation, or classification scheme (one example is not enough). For procedural objectives, a DEMONSTRATION showing how each step is performed is normally

substituted for examples. Both examples and demonstrations should point out common errors.

- Enough PRACTICE items to accommodate slow and fast learners in the target population. Practice items should cover all applications of the rule, regulation, or classification. Practice should go from easy to hard and provide for common errors.

- PRACTICE FEEDBACK which is immediate, provides the correct answer, and explains how to arrive at the correct answer.

The examples above show how to determine which lesson components must be present in instructional materials. Once this is known, then LOOK for those components and check them for adequacy. It's a good idea to write them down and annotate the instructional material itself when a specific lesson component is found. If some components are missing such as EXAMPLES and PRACTICE, it may be possible to salvage the material by adding these components.

ENSURING THE ADEQUACY OF LESSON COMPONENTS

When the required lesson components have been located in the existing materials, they should still be evaluated to determine if each component is adequately presented. For example, are the STATEMENTS, EXAMPLES, and PRACTICE separated and clearly stated so that students can locate them and understand them? To determine the adequacy of lesson components, use the criteria provided in Section 3.1.4.

3.4 DEVELOP INSTRUCTION

Much of the groundwork has already been laid for developing instruction. Hierarchies of

learning objectives have been developed for each terminal objective (Section 2.1). Test items have been developed for each objective (Section 2.2). Learning strategies are specified for each objective (Section 3.1). Existing instructional materials which can be wholly or partially used have been obtained (Section 3.3). Now, the next step is to actually produce instructional materials which will enable students to master all course objectives. Cost effective, "lean", and efficient instruction must be developed which will enable students to pass all performance and knowledge test items (and nothing more).

3.4.1 Kinds of Instructional Materials

The kinds of instructional materials which must be developed for group-paced and self-paced courses include: printed student workbooks, instructor guides, programmed instruction, laboratory exercises, CAI lessons, job aids, video tapes, audio tapes, sound slide programs, etc.

When producing such material, there are certain basic, across the board learning principles which curriculum developers must use to make the course most effective and efficient. In other words, strive to get the maximum amount of learning with the minimum amount of instruction. Following are guidelines for accomplishing this.

1. When developing printed or audiovisual lessons for individual objectives, always follow the learning strategies in Section 3.1.4.

2. Keep the instruction "lean." Provide only the instruction students need to achieve proficiency, and no more. The greater the number of hours taken to reach proficiency, the greater the cost of instruction. Following are some effective ways of ensuring lean instruction:

- Always develop test items first as prescribed in Section 2.2. Then develop "only" the instruction required to pass the test items.

- Develop the "practice" first, then develop only the instruction necessary to "prepare" the student to practice.

. At first, develop lesson materials which are considered "too lean" for the target population. Then, during validation, add the additional explanations, examples, and practice required for students to master the objective.

3. Provide enough practice. People learn by doing, so devise enough opportunities for practice of skills and knowledges. Design a transition practice situation to bring the student efficiently to criterion performance. In early practice sessions, provide students with practice situations they can handle. Then make practice more difficult until the student is capable of performing the task to job entry standards.

4. Make feedback an integral part of practice. Students must have a way of knowing whether or not their practice is correct so they can take corrective action if needed. Knowing when they are right will help students make the correct responses later, and they can focus their efforts on those parts of the task that need refinement. Don't omit feedback. If students are wrong and don't know it, they will learn the wrong response--and will just have to unlearn it. If they take the right action, but do not know why it is right, they will have trouble applying it to new situations.

5. Make instructional materials "appealing" and easy to use. Following are some techniques.

. The READING LEVEL must be appropriate for students in the target population.

. All essential information like charts, tables, etc., should be present; students should not be referred to other places to obtain information.

. Make all lessons PERFORMANCE-ORIENTED, not topic-oriented. Relate instruction to what the student will "do" on the job. Too often, instruction provides "everything you wanted to know about . . .," with no information about what the job is really like. Also, examples and practice should be taken from real job situations.

. Represent the information with pictures, symbols, flowcharts, etc. Format pages in student manuals so as to avoid the "textual look." Generally the lines of textual material are too closely spaced for easy reading and comprehension.

. Limit the amount of information presented on a page. This can be done by always beginning the discussion of a learning objective on a new page and isolating or grouping the components of the lesson so that their relationships have visual meaning.

. When illustrations accompany the text, locate them on the same or facing page or provide fold-out pages so that the student can refer to them with a minimum of page turning as he studies the material.

. Use attention focusing devices such as color, exploded drawings, arrows, or boldface type to enable the student to distinguish more easily the important characteristics of an illustration or example.

. Use Simple Words, Short Sentences, and be Concrete. The purpose in developing instructional materials is to help the students to reach the terminal learning objective and its prerequisite learning objectives. The more effectively one communicates with them, the more likely they are to learn from the instruction. Therefore, it is important NOT to exceed the students' reading level (or vocabulary level if the instruction is audio only).

Writing that is easy to read is usually easy to understand. Use words that the students are familiar with, and put these words into fairly short, uncomplicated sentences.

There are two basic guidelines which should be followed in order to keep reading difficulty low: (1) Select simple words. (2) Keep sentence structure simple.

SELECT SIMPLE WORDS

- Use SHORT, FAMILIAR words when possible.

Poor Choice	Better Choice
accordingly	so
assistance	help, aid
facilitate	help, ease
utilization	use
feasible	possible
implement	carry out

- Use CONCRETE, SPECIFIC words.

Poor Choice	Better Choice
aircraft	B-52
majority of sailors	95% of sailors
physical needs	hunger and thirst
weapon	M-16

Abstract words mean different things to different people. Therefore, they can make your intended meaning unclear. Concrete words communicate more easily and precisely.

- Use NON-TECHNICAL words.

Poor Choice	Better Choice
clavicle	collar bone
NEC	Naval enlisted classification
terrain	ground
experimentation	test

When a technical word cannot be replaced by a non-technical word, and the word is unfamiliar to the students, explain the technical word in a separate sentence either directly before or directly after its first appearance.

Of course, if the students have a technical background in the area of instruction, technical terms are appropriate.

In the case of military abbreviations, it is sufficient to write out the complete term followed by its abbreviation in parentheses the first time; and to use the abbreviation every time afterwards.

- Use ACTIVE verbs.

Poor Choice:	The statement must be updated every three months.
Better Choice:	You must update the statement every three months.
Poor Choice:	The truck will be driven by Seaman Jones.
Better Choice:	Seaman Jones will drive the truck.

This suggestion does not mean that one must never use the passive voice. However, it should be avoided when writing instructins ad procedures, as in the first example; otherwise, the job may not get done! ("Who is to update the statement," is important to your meaning.)

- Avoid changing action verbs into nouns.

Poor Choice	Better Choice
It has been pointed out that, in the Navy, careful initial selection and classification are important procedures in eliminating maladjusted personnel.	If the Navy selects and classifies personnel carefully, it will have fewer maladjusted people.

When verbs are changed into nouns, it is difficult to tell "who did what to whom."

KEEP SENTENCE STRUCTURE SIMPLE

. Use short, simple sentences.

Poor Choice	Better Choice
In the case of the habitual offender, there is nothing to do but remove him from the Service; needless to say, he is what might be termed ineffectual as an officer.	Remove the habitual offender from the Service. He is not an effective officer.

. Avoid strings of prepositional phrases. Example: The hand of the man on the roof of the house.

. Shorten prepositional phrases.

Poor Choice	Better Choice
in a manner similar to	like
with reference to	about
in view of the fact	since
with due regard for	for
in a situation in which	when

. Avoid wasteful words.

Poor Choice	Better Choice
are desirous of	want to
gained from the following source	from
it is recommended that consideration be given to	we recommend that you consider
is responsible for selecting	selects
make provision for	provide for
take appropriate measures	act; do
the fullest possible extent	the most
afford an opportunity	allow

3.4.2 Developing Instructional Media

Thus far, our discussion in this section has centered upon printed materials: that is, instructor guides, narratives, programmed instructions, etc. These materials can and should be augmented with media to illustrate information and, on occasion, to present information.

The more common media used in Navy schools to supplement or present instruction are transparencies, audiotapes, slide and sound-slide presentations, posters, wall charts, and displays. These are most common because they are the easiest to develop and often can be done within the schoolhouse.

Transparencies are an inexpensive medium that can often be produced in-house. Line drawings, schematics and the like from manuals or drafted in dark pen by the instructional developer can be made into transparencies with most duplicating machines.

Audiotapes can be produced at little expense. Although use of this medium is somewhat limited, it is effective for use with students who have difficulty reading, or for objectives that require sound -- identifying alarms, decoding Morse Code, etc.

Sound-slide presentations are somewhat more expensive to develop and often require assistance from media professionals such as photographers and audio producers. A sound-slide presentation is a combination of slides accompanied by a tape recorded narration which explains and describes the slides. A synchronizing pulse may be placed on the audio tape by the audio technician to synchronize the audio and the visual.

Posters, wall charts, and flip charts are inexpensive but effective media, requiring little help from media specialists. Depending on the availability of components, displays can also be useful.

Although more expensive media may be nice to have, nearly all objectives can be presented effectively using a combination of the media described above.

At times, a more costly, more difficult-to-develop media are required to present and support objectives.

Examples of special media include video tapes and 16 mm movies (if they must be developed). Development of such media requires the services of a variety of media specialists.

3.4.2.1 Instructional Media Selection. For instructional purposes, the importance of media lies in the critical correspondence between stimuli present on the job and stimuli presented in instruction. For example, if performance on the job requires the recall, identification, or discrimination of relationship between numbers, symbols, objects, or other abstracts some sort of visual medium is required to correlate these stimuli to the learning environment.

Therefore, the first step in media selection is to determine the appropriate stimulus or combination of stimuli needed to support the type of learning involved in your learning objectives. With this done, instruction can be both relevant and effective within a whole range of instructional media. Next, you should list all available media capable of transmitting the needed stimuli. All of these media, however, may not be practical, useful, or adaptable to the particular instructional program you are developing. For this purpose NAVEDTRA 108 provides comprehensive guidance for cost-effective analysis of instructional media.

3.4.2.2 Media Procurement. The procedures to use for acquisition of media depend upon the type required. For the purposes of this discussion, procedures for obtaining training devices and training films will be addressed separately from other media.

TRAINING DEVICES. Training devices may be classified into two categories: (1) those devices that have been previously procured and which may be available for issue, and (2) those devices that are new requirements which must be funded, developed/produced. Only selected items of minor equipment having a general application for which repeated demands may occur, are placed in systems stock in limited quantities. The majority of training device requirements will fall within category (2). Training devices that are identified in the Directory of Training Devices are not necessarily in stock. An entry in the Directory only indicates that the device was once procured and assigned to the Cog 2"0" inventory under the inventory management of NTEC. Training devices are produced at the request of, and with specific funds provided by, the cognizant training agency to satisfy an existing deficiency or an anticipated requirement generated by a curriculum development or revisions project. Most training devices/aids are contract-allocated for direct delivery to the end users. In practically all cases long lead-time is required for the programming of necessary resources, contracting, and development efforts. Requests for training device development should therefore be identified to CNET in appropriate POM submissions. Major training devices which may be weapon-systems-related, and which may cost in excess of $900K in a given year (singly or the collective cost of multiple units), should also be presented in the form of an issue paper to the Surface Warfare Trainer Group (SWTG) or the Submarine Training Working Group (STWG), whichever is appropriate, for CNO (OP-39/29) concurrence and funding support. Requests for major aviation training devices should be forwarded to CNO (OP-596) via the appropriate chain of command.

If any question arises as to the method for requesting training devices to support a curriculum development project, a letter request via the functional commander to CNET will be considered appropriate.

TRAINING FILMS. Training films are divided into three categories: motion pictures in inventory, commercially produced (proprietary) film, and those requiring production/development.

All requests for motion pictures are submitted to the Naval Education and Training Support Center, Atlantic or Pacific. The procedures stipulated in the functional command appropriate instruction should be utilized.

Requests for loan or permanent cusody of training films should be forwarded to the appropriate NETSC. Requests for procurement of proprietary film or development/production of new motion pictures should be forwarded to the appropriate NETSC via the functional command.

Motion pictures requiring development or production must be identified by the requirements analysis department of the NETSC as either a general motion picture which will have Navy-wide application, or a project which will have limited application. If the request is verified to be a general motion picture by the NETSC, the requirement is forwarded to CNET for funding. If the requirement is for a motion picture project, the NETSC will develop/produce in-house. The functional command should identifify potential technical advisors with the request.

Other media, such as sound-slide productions, video tapes, and color transparencies, are obtained in much the same way as films. Activities submit requests via their functional command to the appropriate NETSC. The NETSC will evaluate the request and produce and distribute the media, if approved.

However media is developed, in-house or by a production facility, it is important to keep in mind that media must support course objectives. Introductions to, and points at which each piece of media will be used, must be documented in the instructor guides and learning center instructor guides.

3.5 DEVELOP GROUP-PACED INSTRUCTION

The instructor guide and student guide shall be based on the curriculum outline and shall provide a detailed description and/or explanation of the subject matter, instructional media, tests, and learning objectives.

3.5.1 The Instructor Guide

The instructor guide provides specific
8 definition and direction to the instructor on learning objectives, equipment and instructional media requirements, and the conduct of the course. The instructor and student activities related to points or headings in the outline of instruction column are placed adjacent to and identified in the same manner as the related point or heading. Techniques and methods, demonstrations, exercises, and applications that collectively enhance the teaching-learning process shall be an integral part of the instructor activity column of the instructor guide.

3.5.1.1 <u>Elements and Format for the Instructor Guide.</u> The instructor guide shall include the following elements prepared in accordance with the format provided in Figures III-18 through III-24:

. FRONT MATTER. Front matter for instructor guides will be present if Lesson Topic Guides are bound or otherwise assembled for a given course. Front matter shall consist of the following:

Cover Page (Figure III-18).

1. Security Classification (if appropriate)

2. Instructor Guide for (Complete course title - ALL CAPS)

3. Course Identification Number

4. Training Activity (ALL CAPS) preparing the Instructor Guide

5. Curriculum Approval Authority (ALL CAPS)

6. Date of preparation of Instructor Guide (If this is a revision the date of the last guide will be placed in parenthesis under the preparation date of the current guide.)

Foreword Page. The foreword is a statement of the purpose and interpretation of the contents of the instructor guide. A foreword page will be submitted by the preparing activity as part of the instructor guide.

Table of Contents (Figure III-19).

Safety Notice. Required for those items peculiar to the process, system, or equipment involved.

How to Use the Instructor Guide. This page includes a general description of the composition, function, and use of the instructor guide.

. LESSON TOPIC GUIDES. Lesson topic guides are composed of two-column pages called Lesson Topic pages, followed by two-column pages called Outline of Instruction/Instructor Activity pages, printed in a horizontal format.

Page Numbering. Pages are identified by a three-part number derived from the unit and lesson topic numbering used in the curriculum outline. All instructor guide pages will be numbered in the lower right-hand corner. Front matter pages will be numbered consecutively, from title page, in lower case Roman numerals. A page number is not placed on the title page and Letter of Promulgation page although these pages are counted. Topic

pages will be numbered with the unit/module, the lesson topic, and the page, as illustrated in Figure III-20. If an instructor finds it necessary to insert full pages of annotation, these pages should be numbered by adding alphabetic designations to the three-part page number carried on the previous sheet; for example, if two pages are inserted after page 2-3-14 of a 20-page lesson topic guide, the additional pages will be numbered 2-3-14A and 2-3-14B.

Lesson Topic Pages. The two-column lesson topic pages contain information that assists the instructor in preparing for the conduct of instruction. Figure III-21 shows a Lesson Topic Page and Figure III-22 shows how the page appears when filled in. The information contained on the pages includes:

1. Course Title. This will be the complete official course title and course identification number as given in the curriculum outline.

2. Classification. This designates the security classification of the material presented in the individual lesson, even though the instructor guide itself may not contain classified information. If not classified, insert "For Official Use Only."

3. Lesson Topic Number. This number will correspond to the number specified in the curriculum outline.

4. Lesson Topic Title. This will be identical to the lesson topic listed in the curriculum outline.

(SECURITY CLASSIFICATION -- If classified

centered top and bottom of page)

INSTRUCTOR GUIDE

FOR

(Complete Course Title)

(Course Identification Number)

PREPARED BY

(Training Activity Preparing the Instructor Guide)

PREPARED FOR

(Curriculum Approval Authority)

DATE

(DATE OF LAST REVISION)

Figure III-18.--Cover Page Format for Instructor Guide.

TABLE OF CONTENTS

Figure III-19.--Table of Contents Format for Instructor Guide.

UNIT/MODULE NUMBERS

- Units and Modules

  UNIT ONE Module 3 1st unit, 3rd module

- Unit or Module

  4.0 4th unit or module

NOTE: Units, modules or both units and modules may be used to identify major sections of a course. Whichever system is used, it should be consistent throughout the course. Modules will be numbered consecutively throughout a unit.

LESSON TOPIC NUMBER

1.5 1st Unit/Module, 5th Lesson Topic

PAGE NUMBERS

4-6-3 4th Unit/Module, 6th Lesson Topic, 3rd page

FIGURE/TABLE NUMBERS

Figure 1.7-5 1st Unit/Module 7th Lesson Topic, 5th figure

NOTE: FIGURES and TABLES will be numbered consecutively throughout a Lesson Topic.

Figure III-20.--Instructional Material Numbering Systems
(Page 1 of 2)

TERMINAL OBJECTIVE NUMBERS

10.0 10th Terminal Objective

NOTE: Once numbered the Terminal Objective will retain that same number throughout. This number has no relationship with the Unit/Module or Lesson Topic number.

ENABLING OBJECTIVE NUMBERS

9.3.1 9th Terminal Objective; 3rd Enabling Objective; 1st level further breakdown of 3rd Enabling Objective.

NOTE: Once numbered the Enabling Objective will retain that same number throughout. This number has no relationship with the Unit/Module or Lesson Topic Number.

Figure III-20.--Instructional Material Numbering Systems.
(Page 2 of 2)

5. Allotted Lesson Time. The time allotted for completion of the individual lesson will be entered here in contact periods for classroom and laboratory, the same as contained in the curriculum outline.

6. Instructional Materials. Instructional materials which the instructor may use for preparation or during instruction will be listed:

a. Instructional references: All source material from which the instructor is to gather information to support the learning objectives. Each source document will be identified by title, page, and paragraph number.

b. Instructional aids: All equipment and audiovisual aids necessary to conduct the lesson will be listed by title and control number in the sequence used.

7. Date. The date of preparation of the instructor guide.

8. Terminal Objective. The terminal objective(s) will be recorded as it appears in the curriculum outline.

9. Enabling Objective. The enabling objective(s) will be recorded as they appear in the curriculum outline.

10. Test. A summary of the testing strategy for the lesson topic will be provided.

11. Homework. Homework assignments will be listed in cordance with the Homework Schedule contained in the applicable Student Guide. (This information is recorded here to aid in instructor preparation.)

LESSON TOPIC GUIDE

(Name of Training Activity)

(Date Prepared)

COURSE TITLE:	TERMINAL OBJECTIVES:
CLASSIFICATION:	
LESSON TOPIC NUMBER:	
LESSON TOPIC:	
ALLOTTED LESSON TIME:	ENABLING OBJECTIVES:
INSTRUCTIONAL MATERIALS:	
INSTRUCTIONAL REFERENCES:	
INSTRUCTIONAL AIDS:	CRITERION TEST:
	HOMEWORK:

Figure III-21.--Lesson Topic Page Format.

LESSON TOPIC GUIDE
Apprentice Training Division

Date: 1 October 1980

COURSE TITLE: Airman Apprentice Training Course, X777-7771

CLASSIFICATION: None

LESSON TOPIC NUMBER: 3.2

LESSON TOPIC: Fundamentals of Hydraulics and Pneumatics

ALLOTTED LESSON TIME: 3 periods

INSTRUCTIONAL MATERIALS:
INSTRUCTIONAL REFERENCES:

1. NAVPERS 16193-B, Fluid Power, Chapters 1 through 4

2. NAVEDTRA 10524-E, Machinist's Mate 3 and 2, Chapter 15

INSTRUCTIOAL AIDS:

1. Chalkboard and equipment

2. Overhead Projector and Screen

3. Transparencies

   #1 "Definition of Terms"
   #2 "Hydraulic Brake System"
   #3 "Simple Pneumatic System"
   #4 "Basic Hydraulic System"

TERMINAL OBJECTIVES:
(This objective is supported entirely by this lesson topic.)

When the students complete this instructional module, they will be able to correctly answer at least 62.5% of criterion test items for the following lesson terminal objectives:

6.15 Select statements from a list which describe fluid power systems in terms of the following; in accordance with NAVPERS 16193-B, Fluid power; and VAVEDTRA 10524-E, Machinist's Mate 3 and 2.

(1) Basic principles of operation
(2) Major components
(3) Fluids used
(4) Potential hazards
(5) Precautions to be observed

ENABLING OBJECTIVES:

(These objectives are supported entirely be this lesson topic.)

When the students complete this lesson topic they will be able to—

6.15.1 Select from a list the correct definitions of the following terms:

(1) Fluid power
(2) Hydraulic
(3) Pneumatic
(4) Pressure

Figure III-22.--Filled-in Lesson Topic Page (Sheet 1 Of 2).

INSTRUCTIONAL AIDS (contd.)

#5 "Basic Pneumatic System"
#6 "Three Types of Hydraulic Liquids"
#7 "Types of Pneumatic Gases"

ENABLING OBJECTIVES (contd.)

6.15.2 Identify the following components of fluid power systems, given the name or function:

(1) Reservoir or receiver
(2) Pump or compressor
(3) Lines
(4) Directional control valve
(5) Actuating device

6.15.3 . . . . .

6.15.4 . . . . .

6.15.5 . . . . .

CRITERION TEST:

Given a written test on Fundamentals of Hydraulics and Pneumatics, the students must achieve a minimum score of 62.5%.

HOME WORK:

Read and study NAVEDTRA 10307-D, Airman, Chapter 4, pp. 82-85.

Figure III-22.--Filled-in Lesson Topic Page (Sheet 2 of 2).

. OUTLINE OF INSTRUCTION/INSTRUCTOR ACTIVITY. The main body of each instructor guide will follow the two-column format in Figures III-23 and III-24. This format enables the instructor to view all instructional factors at a glance. The entries in each column will be in sufficient detail to guide the instructor in the conduct of the lesson.

Outline of Instruction Column. Entries in this column will cover the planned lesson discussion content for each of the six steps specified below. The outline will be developed in sufficient detail so that it can be used as the instructor's primary teaching document. NO FURTHER GUIDE OR LESSON PLAN WILL BE NECESSARY. Major points to be covered during the lesson topic are listed in full textbook narrative form, descriptive phrases, or key words as appropriate, outlining concepts, theories, descriptions, processes, procedures, and so on, that make up the subject matter of the lesson topic. The headings and subheadings shown in the filled in example are illustrative.

When the Instructor Guide is prepared for printing, ample space should be provided throughout for instructor annotations. This is what the outline should contain:

1. Introduction. This step will be developed to promote student interest, to motivate each student with a desire to gain an understanding of the lesson topic, and to enable each student to recognize enabling objectives and their relationship to the terminal objective.

a. Establish contact. Instructor introduces self and topic.

b. Paraphrase Lesson Objectives. State objectives so that they identify what students are to do and convey the testing strategy.

c. Establish Readiness.

(1) Motivating Statements. Relate through stories or examples how and why the material to be learned is important.

(2) Lesson Overview. Provide a brief description of the material to be learned.

2. Presentation. All lesson material will be covered in this step. The main or key points of the step shall correlate with the enabling objectives. These points will be presented in sufficient detail to ensure thorough and complete coverage of all learning objectives. Additionally, the instructor activity column may show diagrams, text materials, audiovisual aids, and other materials supporting the instruction. Each of these materials should be identified adjacent to the point they support in the outline each time their use is planned.

3. Summary. All key points of the presentation which support each enabling objective will be listed.

4. Application. Material in the form of questions, problems, and practical experiences is presented to determine the extent of student learning.

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
I. INTRODUCTION	
A. Establish contact	
B. State Lesson Objectives	
C. Establish readiness	
1. Motivating statements	
2. Lesson Overview	
II. PRESENTATION	
A.	
1.	
2.	
a.	
B.	
1.	
a.	
b.	
2.	
3.	
III. SUMMARY	
A. ETC...	

Figure III-23.--Lesson Topic Guide Format (Sheet 1 of 2).

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
IV. <u>APPLICATION</u>	
A.	
1.	
2.	
a.	
b.	
c.	
3.	
B.	
V. <u>EVALUATION</u>	
VI. <u>ASSIGNMENT</u>	

Figure III-23.--Lesson Topic Guide Format (Sheet 2 of 2).

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
I. <u>INTRODUCTION</u>	
A. Establish Contact	
Introduce yourself, your rate, and give the topic for this lesson: Fundamentals of Hydraulics and Pneumatics.	Write name, rate, and topic—Fundamentals of Hydraulics and Pneumatics—on the board.
B. Paraphrase Lesson Objectives	
1. Terminal Objective: You will be expected to write:	
a. The basic principles of operation of Fluid power systems. b. The major components of Fluid power systems. c. The fluids used in Fluid power systems. d. . . . . e.	
2. Enabling Objectives	
a. Define terms unique to Fluid power systems. b. Identify components of Fluid power systems. c. . . . . d.	
C. Establish Readiness	
1. Motivating Statements	Get students ready to learn:
Motivate students by relating sea stories, real or imaginary, to help them see what Fluid power systems involve. Explain how this lesson ties in with other lessons.	1. Trainee motivation. 2. Learning incentives.
2. Lesson Overview	Bring out the need and value of the material being presented.
In the following lesson we are goin to look at Fluid power systems and discuss some of the terminology or buzz words used when talking about these systems. We will discuss the principles of both hydraulic and . . .	3-2-1

Figure III-24.--Filled-in Lesson Topic Guide (Sheet 1 of 2).

OUTLINE OF INSTRUCTION	INSTRUCTOR ACTIVITY
II. PRESENTATION	
A. Definition of terms.	Objective 6.15.1
1. Fluid power	
a. Defined as power created by pumped or compressed fluids used to push, pull, rotate, regulate, or drive mechanical devices.	Show transparency #1, "Definition of Terms." Show only the definition of Fluid power. Keep other definitions covered.
b.	Uncover definition of Hydraulic.
c.	
2. Hydraulic	
a. Defined as . . .	
b.	
c.	Ask given questions.
Q.1 What is the purpose of Fluid power systems?	A.1. To convert energy to useful work.
Q.2 What type of Fluid power system would use liquids as its fluid?	A.2. Hydraulic System.
B. Principles of operation of Fluid power systems	
1. Basic components . . .	
a.	Objective 6.15.2
b.	
(1)	
	3-2-2

Figure III-24.--Filled-in Lesson Topic Guide (Sheet 2 of 2).

Instructor Activity Column. This column provides guidance to the instructor on teaching the subject matter in the outline of instruction column. The course developer will enter in this column teaching-learning activities or behaviors which enhance and encourage productive learning on the part of the student. The course developer will also provide guidance to the instructor on maintaining maximum student interest and participation, measuring student comprehension, and planning summaries at strategic points in the lesson. The instructor may also list materials, references, and enabling objectives in this column, but such entries are not to be construed as meeting the requirement for entering teaching-learning activities herein. If it is necessary to have the students perform a specific activity in conjunction with the lesson, indicate such in this column. For example, "Have students label the diagram in the student guide, page 4-3-3."

3.5.2 The Student Guide

The student guide is a series of instruction sheets which collectively provide the student with the supplementary material (in addition to technical manuals) needed for successful completion of a particular course of study. Prepared in coordination with the course instructor guide, the student guide includes instruction sheets which contain material such as notetaking guides, reading assignments, homework study questions, problem analysis exercises, diagram sheets, and other special units of additional or amplifying information. The student guide consists of all front matter and instruction sheets assembled into a binder. The student guide should not duplicate existing documents and manuals; it is designed to be used in conjunction with them as software training materials for a course. At times, however, it is more efficient to duplicate a few pages from a manual if, for example, the manual is very large or has classified sections.

3.5.2.1 <u>Elements and Format for the Student Guide.</u> Student guides shall include the

following elements prepared in accordance with the format provided in Figures III-25 through III-29.

. FRONT MATTER. The front matter for each volume of the student guide shall consist of the following:

Cover Page. Included on the cover page (Figure III-25):

1. Security Classification (if classified)

2. Student Guide for (Complete course title - ALL CAPS)

3. Course Identification Number

4. Volume Number

5. Training Activity (ALL CAPS) preparing the Student Guide

6. Curriculum Approval Authority (ALL CAPS)

7. Date of preparation of Student Guide (If this is a revision the date of the last guide will be placed in parenthesis under the preparation date of the current guide.)

Foreword Page. The foreword is a statement of the purpose and interpretation of the contents of the student guide. A foreword page will be submitted by the preparing activity as part of the student guide.

Table of Contents (Figure III-26).

Safety Notice. Required for those items peculiar to the process, system, or equipment involved.

How to Use the Student Guide. Guidelines and instructions for use of each section of the student guide.

Course Schedule. A day-by-day class schedule will be provided.

Homework Schedule. A day-by-day schedule of homework assignments will be included.

. MAIN BODY OF STUDENT GUIDE. The main body of the student guide consists of printed pages that aid the student in the acquisition of the subject matter for the course. It may include Information Sheets, Assignment Sheets, Notetaking Sheets, Lab Sheets, and Diagram Sheets. These should be arranged by lesson topic in a logical sequence reflecting student use.

For example, 3-2-4I (unit, lesson topic, sheet type) signifies the fourth information sheet for the second lesson topic of the third unit. Each type of instruction sheet or aid, whether it be an information sheet, assignment sheet, notetaking sheet, job sheet, student workbook, or diagram sheet will be numbered in such a manner that it easily identifies the specific instructor guide it was designed to support. The level of comprehension of all written material in the student guide shall be consistent with the requirements of the job, unless othewise specified by the Curriculum Control Authority.

. CONTENTS OF STUDENT GUIDE. The following is a description of the contents of the instructional materials.

. Assignment Sheets (Figure III-27).

1. Introduction. A statement of the purpose and scope of the assignment.

2. Lesson Topic Learning Objectives. The learning objectives included here are the same as for the corresponding lesson topic in the instructor guide.

(Security Classification, if Classified

centered top and bottom of page)

STUDENT GUIDE

FOR

(Complete Course Title)

(Course Identification Number)

VOLUME NUMBER

PREPARED BY

(Training Activity Preparing the Student Guide)

PREPARED FOR

(Curriculum Approval Authority)

(DATE)

Figure III-25.--Student Guide Cover Page Format.

TABLE OF CONTENTS

Figure III-26.--Example of Table of Contents for Student Guide.

ASSIGNMENT SHEET

(Title) ______________________

Assignment Sheet No. ____________

INTRODUCTION

LESSON TOPIC LEARNING OBJECTIVES

#

#

#

#

STUDY ASSIGNMENT

STUDY QUESTIONS

1.

2.

3.

Figure III-27.--Assignment Sheet Format for Student Guide.

3. Study Assignment. Specific study instructions identifying paragraphs, pages, and publications. If there is a best sequence to study scattered portions of the test, the sequence is given.

4. Study Questions. Thought-provoking questions on important portions of the assignment. Preference is given to those types of questions which require mental decisions similar to those the student would make on the job and those which would measure the student's accomplishment of the learning objectives.

. Information Sheets (Figure III-28).

1. References. The references provide complete identification of all reference material used in compiling the information.

2. Information. Student information sheets shall consist of narrative descriptions, diagrams, sketches, charts, graphs, pictures, or other audiovisual material, as necessary, for students' reference to support the information presented in the course. They may be excerpts from other documents not readily available to the student or original materials. Narrative descriptions and diagrams shall not be extracted from the related end-item technical manuals for use as student information sheets unless changes are required in the material to make it more readily adaptable to the course presentation. A paper reproduction of each audiovisual aid used in the course may be included in the student information sheets.

INFORMATION SHEET

(Title) ______________________________

Information Sheet No ______________

INTRODUCTION

____

____

____

____

____

____

REFERENCES

____

____

____

____

____

____

INFORMATION

____

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Figure III-28.--Information Sheet Format for Student Guide.

. Notetaking Sheets. Notetaking sheets may be needed for lessons that provide important information to which the student must refer from time to time or recall from memory. These sheets shall contain an outline of the subject matter of the lesson topic guide. This may include drawings for students to label, fill-ins, diagrams, or any other activity which optimizes learning.

1. References. The complete identification of all reference publications pertinent to the lesson topic.

2. Notetaking Outline. An outline of the subject matter headings of the associated lesson topic guide. Adequate space is provided for the student to take notes.

. Job Sheets. Job sheets shall conform to the format of Figure III-29. Where appropriate, provisions shall be made for the instructor's initials and date to indicate satisfactory completion of the specific task or duty during student performance. Job sheets contain the following:

1. Introduction. A brief statement of the purpose, scope, and value of the job sheet and suggested completion time.

2. References. Complete identification of all publications referenced in the job steps.

3. Equipment and Materials. A listing of all equipment, tools, and materials necessary for the performance of the job steps.

4. Job Steps. Detailed procedures for performing the assigned tasks on the system/equipment. If the job steps contained

in the technical documentation used in the course are of sufficient detail, reference shall be made to the applicable section/page to perform them rather than reproducing them in this section.

5. Precautions to be Observed During Accomplishment of this Job. Precautions pertaining to personnel or equipment safety or to misleading conclusions which could possibly be derived through improper analysis of observed indications and data.

6. Self-Test Items. Thought-provoking questions on the performance of the job steps. Given as an "open book" test, they permit the student to use information in the technical manual and other course material in arriving at the solutions and are designed to measure the student's understanding of the procedures.

JOB SHEET

TITLE: ____________________

JOB SHEET NO. ____________ TIME: ________

subtitle (if required) ____________

INTRODUCTION;

____

____

LESSON TOPIC LEARNING OBJECTIVE(S):

____

____

REFERENCES: ____________________

____

EQUIPMENT AND MATERIALS: ____________

____

JOB STEPS:

Precautions to be observed: ____________

Step 1. ____________________

Step 2. ____________________

NOTE: Have instructor verify procedure. Date: ________

Instructor Initial: ________

Step 3. ____________________

Step 4. ________ (etc) ________

NOTE: Have instructor verify procedure. Date: ________

Instructor Initial : ________

SELF-TEST ITEMS:

1. ____________________

2. ____________________

Figure III-29.--Lab Sheet Format for Student Guide.

3.6 DEVELOP SELF-PACED INSTRUCTION

Instruction in which students of different aptitudes can progress through an instructional program at their own rate is called self-paced instruction. This enables slower students to take more (but not unlimited) time for additional study and practice. Faster students can finish a course more quickly.

In Section 3.1.5, course learning objectives were analyzed to determine the most effective instructional delivery system - Group-paced or Self-paced. This section provides the necessary guidance for developing the supporting self-paced instructional materials. Self-paced learning systems used in Navy courses are of two types: Instructor Managed Instruction (IMI) and Computer Managed Instruction (CMI). This manual provides direction for development of both IMI and CMI systems. Additional policy and guidance for CMI is provided in CNETINST 5260.1.

3.6.1 Structure of Self-Paced Instruction

Instructional components for self-paced courses consist of: (1) Modules and (2) Lesson Topics.

. MODULES. Courses or "Major Subject Areas" of a course are divided into numerous components of instruction called "Modules." A "Major Subject Area" of a course can be compared to a Unit of Instruction in a Group-Paced Course. The term "Unit" may be substituted for Major Subject Area if desired. A Module is a self-contained instructional unit designed to cover, wholly or in part, one or more terminal objectives. The module is the basic level of instruction in self-paced courses. Most IMI and CMI progress testing is done at the end of each module, e.g., "End of Module Progress Tests." A primary purpose of these Progress Tests is to provide the LCI with information regarding student progress. For this reason, Modules do not normally contain more than

seven hours of instruction. Therefore, several Modules may be required to cover a major subject area such as Digital Fundamentals, Telephones, etc. Within-course comprehensive tests would be administered at the end of these major study areas. (See Figure III-30.)

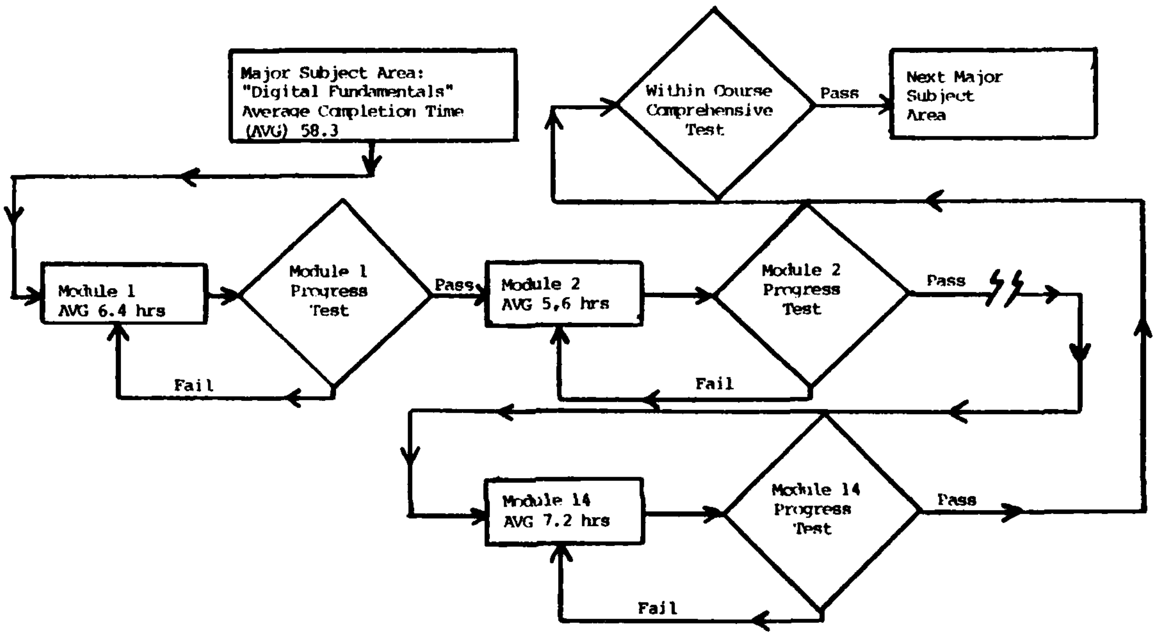


Figure III-30.--Relationship of Modules to Major Subject Areas.

. LESSON TOPICS. Each of the Modules described above will consist of one or more Lesson Topics. Lesson Topics cover, wholly or in part, terminal objectives and supporting enabling objectives. Progress Checks (Self-Tests) are provided to the student at the end of Lesson Topics. (See Figure III-31.) A more thorough explanation of Lesson Topics is provided in subsequent paragraphs.

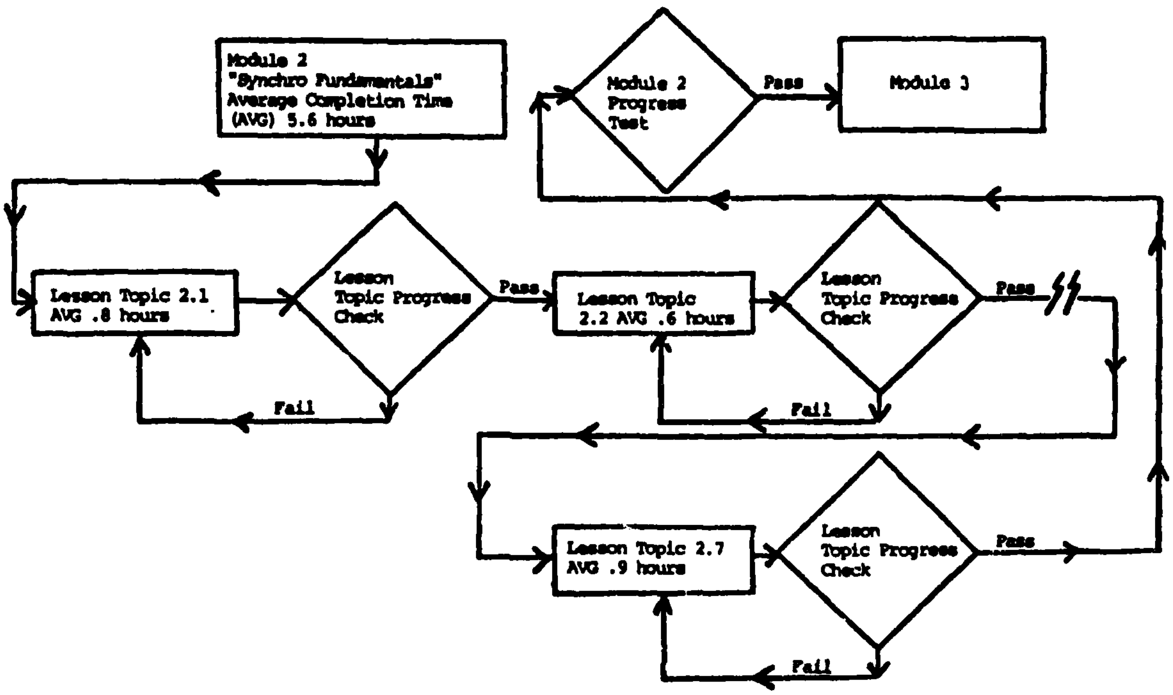


Figure III-31.--Relationship of Lesson Topics to a Module.

3.6.2 Instructional Materials for Self-Paced Courses

. The personnel who develop self-paced instruction must be aware of the importance of making the materials useful and understandable for students. Management should ensure that all persons who develop self-paced materials are thoroughly trained in the job.

. The primary instructional materials for self-paced courses are:

1. Module Booklets

2. Supporting Instructional Materials for Modules

3. Learning Center Instructor (LCI) Guides

. Numbering System for Instructional Materials. The numbering system for self-paced instructional materials is the same as for group-paced materials. Refer to Figure III-20 in Section 3.5.1 for further guidance.

3.6.2.1 <u>Module Booklets.</u> Lesson Topics and associated materials which make up an Instructional Module will normally be bound into a Module Booklet. Each Module Booklet shall contain: (1) a Cover Page, (2) a Module Overview, and (3) the Lesson Topics which make up the Module. Figures III-32 through III-36 provide examples of these components. An additional explanation of each component is provided in the following paragraphs.

. Module Cover Page (Figure III-32) contains:

1. Security Classification (if classified)
2. Module Number
3. Complete Module Title
4. Complete Course Title
5. Course Identification Number
6. Activity preparing the Module.
7. Date

. Module Overview (Figure III-33). The Module Overview will contain a minimum of the following elements: a brief introduction to the Module, a list of Lesson Topics with average completion times for each totaled to show the average completion time for the module, and any general instructions to the student concerning the use of the Module Booklet.

. Lesson Topics. The remaining portion of the Module Booklet will consist of the Lesson

Topics which make up the Module, sequenced in the order in which they are to be presented. Each Lesson Topic shall contain the elements listed below:

1. Lesson Topic Cover Page

2. Lesson Topic Overview

3. List of Study Resources

4. Lesson Topic Summary

5. Narrative Form of the Lesson Topic

6. Programmed Instruction (PI) Materials
9 (when appropriate)

7. Audiovisual Instructional Materials (when appropriate)

8. An Audio Cassette Form of the Lesson Topic (when appropriate)

9. Lesson Topic Progress Checks complete with feedback and remediation

10. Job Programs for Laboratory/Shop Activities (when appropriate)

Additional explanations for each of the above Lesson Topic elements are provided below:

1. Lesson Topic Cover Page (Figure III-34). The Cover Page should contain:

- Full Course Title
- Suitable Artwork, if desired
- Module Number
- Lesson Topic Number
- Full Lesson Topic Title
- Date

(Security Classification, if classified)

MODULE (Number)

(Complete Module Title - ALL CAPS)

FOR

(Complete Course Title - ALL CAPS)

(Course Identification Number)

PREPARED BY

(Activity Preparing the Module)

(DATE)

Figure III-32.--Module Cover Page Format.

MODULE OVERVIEW

MODULE (Number)

(Full Course Title)

(Full MODULE Title - ALL CAPS)

In this module...(Brief introductory remarks or paragraph)...

____

____

List of Lesson Topics included in Module:

Lesson Topic 1. (Title)....Avg. Time: _____ (Contact Hr)
Lesson Topic 2. (Title)....Avg. Time: _____ (Contact Hr)
etc....................

Total Module Avg. Time (Contact Hr)

(Insert any general instructions to student concerning the use of this MODULE BOOKLET and any of its supporting materials)

Figure III-33.--Module Overview Format.

(Full Course Title)

(Suitable Art Work If Desired)

MODULE NUMBER ______

LESSON TOPIC (NUMBER)

(FULL LESSON TOPIC TITLE)

DATE

Figure III-34.--Lesson Topic Cover Page Format.

MODULE (Number)

LESSON TOPIC (Number)

LESSON TOPIC OVERVIEW

LESSON TOPIC (NUMBER)

(FULL LESSON TOPIC TITLE)

In this Lesson Topic. . . . . (Brief introductory paragraph) ________________

____

____

The LEARNING OBJECTIVES of this LESSON TOPIC are as follows:

1. (State Lesson Topic Objectives in full behavior, conditions, standard/s)
2. (etc.)

(These LEARNING OBJECTIVES must correspond to ENABLING OBJECTIVES (possibly in some instances, TERMINAL OBJECTIVES achieved in part by a Lesson Topic) listed in the CURRICULUM OUTLINE for Lesson Topic breakdown)

(Statement to the student that he or she should review the "LIST OF STUDY RESOURCES" and read the Lesson Topic LEARNING OBJECTIVES before beginning the Lesson Topic.)

Figure III-35.--Lesson Topic Overview Format.

2. Lesson Topic Overview (Figure III-35). The Overview should contain a brief introductory paragraph, a list of Lesson Topic objectives, and instructions to the student. CAUTION: Ensure that the Lesson objectives are written in words which are understandable to the student. This can normally be determined during the one-on-one validation process. If students have trouble understanding objectives as written in the Curriculum Outline, either the objectives in the Curriculum Outline need changing or an additional explanation should be provided for each objective.

3. List of Study Resources (Figure III-36). Note that Figure III-36 lists the learning resources that are available (and where located) for use by the student. This list shall include those study resources that are located in the Module Booklet and those located elsewhere in the Learning Center (such as audiovisual programs and reference materials).

The Module Booklet contains most of the printed textual materials which support the Lesson Topic. It MUST contain two written forms of the lesson for each Lesson Topic. These are the (1) Lesson Topic Summary and (2) the Narrative Form of the Lesson Topic. Use of a third written form of the lesson, the Programmed Instruction (PI), is optional.

The above requirement applies to most knowledge objectives and to performance objectives which can be taught using a printed text. Exceptions to this requirement are when another medium (e.g., a video tape which covers all lesson objectives) is determined more effective and an alternate Lesson Narrative would be of little value. Or, when Lesson objectives require hands-on performance in a shop or laboratory.

MODULE (Number)
LESSON TOPIC (Number)

LIST OF STUDY RESOURCES

(FULL LESSON TOPIC TITLE)

To learn the material in this LESSON TOPIC, you have the option of choosing, according to your experience and preferences, any or all of the following study resources:

Written Lesson Topic presentations in Module Booklet:

1. Lesson Topic Summary
2. Programmed Instruction Form of Lesson Topic
*3. Narrative Form of Lesson Topic
**4. Lesson Topic Progress Check

Additional Materials:

1. Audiovisual Materials (As applicable)
2. Job Program Materials for Lab/Shop activities (As applicable)
3. Student Response Sheets (As applicable)
   a. Information Sheets
   **b. Assignment Sheets
   **c. Job (Data) Sheets
   d. Diagram/Formula/Schematic Sheets
   e. Programmed Instruction Response Sheets
   f. Answer Sheet for use with all tests
   g. Notetaking sheets

Enrichment Materials: (References)

(Statement to the student that he or she may use any or all resources listed above, including the Learning Center Instructor but all materials listed are not necessarily required to achieve Lesson Topic Objectives. The Progress Check may be taken at any time.)

* Duplicative Form of Narrative on Audio Cassette Tape may be provided.

** Progress Self-Checks, Job Sheets, and Assignment Sheets should be separate from Module and Lesson Topic Material in courses with large student inputs.

Figure III-36.--List of Study Resources Format.

MODULE (Number)
LESSON TOPIC (Number)

PROGRAMMED INSTRUCTION FORM

OF

LESSON TOPIC

(LESSON TOPIC TITLE)

(Programmed Instruction (PI) will be developed in accordance with approved procedures; may be linear or branching; may make provision for interspersed test frames for acceleration; will in all cases cover all Lesson Topic Learning Objectives and provide Criterion Test items in the Progress Check which measure achievement of Lesson Topic Learning Objectives. The PI form, like the Narrative Form, is designed to cover all Lesson Topic Learning Objectives and can stand alone as one form of Lesson Topic presentation.)

Statement to the student:

"At this point, you may take the Lesson Topic Progress Check. If you answer all self-test items correctly, proceed to the next Lesson Topic. If you incorrectly answer only a few of the Progress Check Questions, the Correct Answer page will refer you to the appropriate pages, paragraphs, or frames so that you can restudy the parts of this Lesson Topic you are having difficulty with. If you feel that you have failed to understand all, or most, of the Lesson Topic, select and use another medium of instruction: Narrative, Audiovisual materials (if applicable), or consultation with Learning Center Instructor, until you can answer all self-test items on the Progress Check correctly."

Figure III-37.--Programmed Instruction Format (Optional).

Both the Summary and the Narrative forms must be designed to cover, to varying degrees, all of the learning objectives of the Lesson Topic. The Narrative form and the PI form (if used) should be capable of standing alone as alternate forms of the lesson. Also, if the PI is used, the words and content of the PI should NOT be verbatim with the Narrative. Figure III-37 shows the format of a PI form of the Lesson Topic.

The Lesson Topic Summary is a condensation of the Narrative Form and may be used by students who have had previous knowledge or experience with the lesson subject matter. It may also be used for review by students when studying for Module Tests or Comprehensive Tests.

If a Programmed Instruction version of the lesson is not provided, then care must be taken to develop a Lesson Narrative which serves the needs of all members of the target population, both fast and slow learners. To accomplish this, the Lesson Narrative MUST be divided into optimum "learning steps" or "chunks" of instruction with illustrations placed appropriately within the "text" and practice questions and feedback provided at the end of each "chunk." This type of "embedded" practice will be in addition to the Lesson Topic Progress Check. The reason for this is that most lower aptitude students learn best when instruction is delivered in optimum steps with *frequent student interaction.* Also, slower students require a heavier use of illustrations, pictures, and examples than faster learners. A Lesson Narrative developed in this manner can be as effective for the slower learner as the PI. Guidance for developing this type of Narrative is provided in Section 3.1.4.

Another problem encountered when using a single Narrative form of the lesson is remediation for students who fail Progress Check or Test items. If alternate forms of the Lesson are not available for remediation, then students must be directed back to the Lesson materials they have already studied. This problem can be reduced by providing separate explanations, examples, and practice in the Narrative for remediation purposes.

MODULE (Number)
LESSON TOPIC (Number)

LESSON TOPIC SUMMARY

(Lesson Topic Title)

(CONDENSATION OF NARRATIVE FORM OF LESSON TOPIC)

Statement to the student:

"At this point, you may take the Lesson Topic Progress Check. If you answer all self-test items correctly, proceed to the next Lesson Topic. If you incorrectly answer only a few of the Progress Check Questions, the Correct Answer page will refer you to the appropriate pages, paragraphs, or frames so that you can restudy the parts of this Lesson Topic you are having difficulty with. If you feel that you have failed to understand all, or most, of the Lesson Topic, select and use another medium of instruction: Narrative, Audiovisual materials (if applicable), or consultation with the Learning Center Instructor, until you can answer all self-test items on the Progress Check correctly."

Figure III-38.--Lesson Topic Summary Format.

MODULE (Number)
LESSON TOPIC (Number)

NARRATIVE FORM

OF

LESSON TOPIC

(LESSON TOPIC TITLE)

(The NARRATIVE FORM of Lesson Topic is written in textbook form in sufficient detail to provide coverage of Lesson Topic LEARNING OBJECTIVES. If an alternate PI form of the lesson is not provided, the NARRATIVE must be designed to accomodate both the slower and faster learners in the target population. This is done by dividing the NARRATIVE into optimal sized "learning steps" and providing practice and feedback after each step. This "embedded"practice will normally be in addition to the self-scored Progress Check provided at the end of each Lesson-Topic. The student responses may be "Matching, Multiple- Choice" or "Constructed Response"(fill-in-blank) types. In any case, the NARRATIVE FORM will cover all Lesson Topic LEARNING OBJECTIVES and, like the PROGRAMMED INSTRUCTION FORM, is capable of standing alone when followed by the PROGRESS CHECK for measurement of student achievement.)

Statement to the Student:

At this point, you may take the PROGRESS CHECK. If you answer all SELF-TEST ITEMS correctly, proceed to the next LESSON TOPIC. If not, select and use another medium of instruction for the LEARNING TOPIC. This may involve discussion with your Learning Center Instructor before proceeding to the next LESSON TOPIC or before requesting the MODULE TEST if the last LESSON TOPIC in the MODULE has been completed. If you incorrectly answer only a few of the PROGRESS CHECK questions, the CORRECT ANSWER PAGE will refer you to the appropriate pages, paragraphs, or frames so that you can restudy the parts of this LESSON TOPIC you are having difficulty with. If you feel that you have failed to understand all or most of the LESSON TOPIC, select and use another medium of instruction."

(NOTE: It may become advantageous to provide verbatim cassettee tapes of the Narratives (and Summaries) for student use either without or in conjunction with the written narratives if the student either has a reading problem or responds better to an aural stimulus.

Figure III-39.--Lesson Topic Narrative Format.

4. The Lesson Topic Summary (Figure III-38). The Lesson Topic Summary is in written narrative form, but is a condensation of the Narrative form of the Lesson Topic. It covers the lesson topic learning objectives but does not provide the detailed information found in the Narrative form.

5. Narrative Form of Lesson Topic (Figure III-39). The Narrative serves as the primary form of instruction for learning objectives which require a printed text. Curriculum developers should recall from Section 3.1.4 that when lesson topic objectives require higher levels of learning such as "classifying objects" or "solving problems," the Narrative should include adequate explanations, examples, practice items, and feedback. This will provide students, depending on their individual aptitudes, with the option of selecting the amount of explanation, examples, and practice required for mastery of the objective. Read Figure III-35 for information regarding the content of the narrative form of the Lesson Topic.

. Guidelines for Developing Narratives. To increase the effectiveness and appeal of printed instructional materials, the following general guidelines should be followed when developing Lesson Narratives. (Figures III-1 through III-5 in Section 3.1.4.3 are excellent examples of how these guidelines are applied.)

a. Format each page so as to avoid the "textual look." Generally the lines of textual material are too closely spaced for easy reading and comprehension.

b. Try to limit the amount of information presented on a page. This can be done by always beginning the discussion of a learning objective on a new page and isolating or grouping the components of the Lesson Topic so that their relationships have visual meaning.

c. Where illustrations accompany the text, locate them on the same or facing page or provide fold-out pages so that the student can refer to them with a minimum of page turning as he studies the material.

d. Use attention focusing devices such as color, exploded drawings, arrows, or boldface type to enable the student to distinguish more easily the important characteristics of an illustration or example.

e. Examples and practice items should progress from easy to hard. Early examples and practice items may be simplified. The final items should be typical of the job.

f. Be sure that explanations, examples, and practice include the opportunity for "common errors."

g. Provide enough examples and practice to cover the content area thoroughly.

h. For practice items and Progress Checks provide immediate feedback as to whether the answer is correct, what the correct answer is, and why it is correct. Remember, practice alone does not make perfect; only practice with feedback makes perfect. If the feedback is delayed too long and if it does not state what the correct response is and why it is correct, it is of questionable value.

i. Don't make students play "instructional hide-and-seek." Make sure students understand what they will be tested on and how they will be tested. This can be done by maintaining consistency between the objective, presentation, examples, practice, and tests. Tests should not include anything that has NOT previously appeared in practice and vice versa. Also, the key components of the lesson (explanation, examples, practice, and feedback) should be "separated" and "identified" so that the student knows what they are and where to locate them.

NOTE: Sections 3.1.4 and 3.4.1.2 provide additional guidance for improving the quality of Lesson Narratives.

6. Lesson Topic Progress Check. Another important study resource for students is the Progress Check. This is normally part of the Module Booklet. The Progress Check is a "self-administered," "self-scored" criterion test which measures achievement of all Lesson Topic learning objectives. The student normally takes the Progress Check when he/she has finished studying the lesson materials and wants to know if he/she has mastered all lesson objectives and is ready to either move on to the next Lesson Topic, or take the instructor (computer) administered Module Progess Test (if the last Lesson Topic has been completed). In some cases, students may elect to take the Module Test after they examine the Progress Checks and determine that they know the material (without actually going through the material). When Lesson Topics contain skill-type learning objectives, these must be tested by some form of performance activity and may or may not be suitable for inclusion in a self-scored Progress Check. In the Module Booklet, instructions to the student could read like those shown at the bottom of Figure III-37.

Checklist for Determining the Adequacy of Progress Checks.

1. Normally, there must be a Progress Check for each Lesson Topic. The Progress Check may be placed at the end of the Narrative Form or at other locations, provided the purpose of the Progress Check is not compromised.

2. Progress Check items must be self-administered and self-scored by the student. They must always be available for use by students when studying for Module and Comprehensive Exams.

3. Progress Check items must measure all lesson learning objectives and be consistent with:

- Lesson learning objectives
- Lesson learning materials

. Tests and Exams

Module Progress Tests

Within-Course Comprehensive Exams

Final Course Comprehensive Tests

NOTE: Curriculum developers should recall that it is not always necessary and is usually unrealistic to formally test all lower level enabling objectives taught at the Lesson Topic level in Module Tests and Comprehensive exams. A good rule-of-thumb is to formally test only the higher level "performance" objectives and "critical knowledge" objectives. For example, if a Lesson Topic Progress Check item asks the student to: "Write from memory the formula for Ohm's Law," and a later enabling objective in the Module requires the student to solve problems unaided using Ohm's Law, only the latter objective would be formally tested. Thus, many less critical "knowledge" objectives need only be tested through self-scored Progress Checks or practice items. Such decisions must be made by a knowledgeable curriculum developer.

4. Answer keys to all Progress Checks should be immediately available to the student so that the student can plan his/her own remediation. Stuents should be provided the answer, a short explanation of why it is the correct answer (when applicable), and where to go in the instructional materials for further remediation. Ideally, Progress Check answers should appear on the next page following the Progess Check questions. However, they can be placed together at the back of the Module Booklet. It is important that answers to Progress Checks provide adequate self-remediation to students. Lesson Topics which dictate Learning Center Instructor (LCI) interactions each time a student fails Progress Check items are wasteful of human resources.

5. At the end of the Lesson Topic presentation, a statement should advise the student that he/she may proceed to the Progress

Check, if, based on own judgment, he/she is ready to do so. This statement should further indicate that when all questions can be answered, he/she will go on to the next Lesson Topic, etc. until the entire Module is completed. When all Lesson Topics in the Module are completed, the student is directed by a statement in the Module Booklet to go to the LCI and ask to take the Module Test. The Module Test is a formal test scored and remediated by either the LCI or computer.

3.6.2.2 Supporting Instructional Materials for Modules. Instructional materials which are not a part of the module booklet, but closely support it, are described in the following paragraphs.

- Audiovisual Instructional Resources. Where it has been determined to be feasible and instructionally sound, an audiovisual presentation of the whole or a part of the Lesson Topic may be used as the primary study resource. In such cases an alternative Narrative form of the Lesson may or may not be necessary. For example, the curriculum developer may determine that since the learning objectives require motion or a heavy concentration of photographs, it is unrealistic to use a printed Narrative for such an objective. In such cases, only the audiovisual (AV) version of the Lesson would be developed.

During the production of new audiovisual presentations, curriculum developers are encouraged to produce "interactive" audiovisual materials which provide adequate examples, practice, and feedback to students. Also, curriculum developers should carefully plan the procedures which will be used for self-testing, self-remediation, and computer-assigned remediation. These procedures will vary, depending upon what other forms of media are available for a given Lesson Topic.

If an audiovisual presentation is prepared for a Lesson Topic for which there are parallel forms of the material available (e.g., Narrative), the student may use the Progress Check provided in the Module Booklet. The last slide in the

audiovisual program should direct the student to the Progress Check.

In a course in which there are only a few audiovisual programs available, it may be more practical to provide the Progress Check on slides at the end of each program. The final slide then would provide framed-referenced correct answers for remediation purposes.

In a course in which a large number of audiovisual presentations are provided, a separated "Audiovisual Program Progress Check Booklet" could be produced. Each self-test correct answer sheet in the booklet would then reference the appropriate frames in its corresponding program for purposes of self-remediation.

. Job Program Materials for Laboratory/Shop Activities. A Job Program is similar to the Job Sheet used in group-paced courses except that it uses programming techniques typical of Programmed *Instruction*. The Job Program is used by students to learn skills which require hands-on performance activity in labs/shops. Typically, students perform steps in a Procedural task and are given immediate knowledge of results before proceeding to the next step or task.

The job program will be prepared in accordance with the format provided in Figure III-40.

. Student Response Sheets. Student response sheets for a self-paced course will not be radically different from those used in a group-paced course. These response sheets will include variations of assignment sheets, diagram or formula sheets, and notetaking sheets. They will also include answer sheets to be used for pretests, module tests, and posttests. Some test answer sheets are chemically treated to provide instant student feedback. Information sheets may be used in certain instances and retained by the student, but most information sheets will not normally require an immediate response from the student. A representative list of student

response sheets used in a self-paced course includes:

1. Assignment Sheets

2. Job Sheets and Data Sheets to be used with Job Programs

3. Diagram (or Formula) Sheets--may include block diagrams, schematics, charts, etc.

4. Answer Sheets for Progress Checks, Module Tests, Pretests, Posttests, Special Tests (may include chemically treated answer sheets)

5. Information Sheets (as required)

. Enrichment Materials. In addition to the Module Booklet, audiovisual material, Job Programs for laboratory/shop activities, and various student response sheets, other reference materials that are course related are made available to the student in the learning center environment. These enrichment materials will include such things as textbooks and various Navy technical publications. They are placed in an accessible location in the learning center and the student is instructed to make use of them according to his or her own needs. It should be reemphasized that the LCI is a valuable enrichment source and a reference to which the student is encouraged to go for assistance as required.

3.6.3 Learning Center Instructor (LCI) Guide

Previous paragraphs discussed the structuring of IMI and CMI courses into Modules and Lesson Topics. This section discusses another critical and very necessary part of self-paced instruction, the Learning Center Instructor Guide. This guide provides the instructor with a description of his/her many duties and responsibilities as a learning center instructor. It also gives the LCI Student Remediation Guides which are helpful in prescribing the proper remediation to students requiring additional help.

3.6.3.1 Elements and Format for the Learning Center Instructor Guide. The LCI Guide shall consist of three major elements: (1) Front Matter, (2) LCI Duties and Responsibilities, and (3) Student Remediation Guides. These will be prepared in accordance with the formats provided in Figures III-41 through III-44.

. Front Matter. The front matter of the Learning Center Instructor Guide shall contain the following:

1. Cover page (Figure III-41). Includes the following:

- Security Classification (if classified)
- Learning Center Instructor's Guide for (Complete Course Title)
- Course Identification Number
- Training Activity preparing the Learning Center Instructor Guide
- Curriculum Approval Authority
- Date

2. Foreword Page. The Foreword Page is a statement of the purpose and contents of the LCI Guide. A Foreword Page will be submitted by the preparing activity as part of the Learning Center Guide. The course curriculum development activity, upon approval of the Learning Center Instructor guide, will supply a Letter of Promulgation.

3. Table of Contents (Figure III-42).

4. Safety Notice. The safety notice shall be tailored to meet the specific safety requirements of Learning Center Instructors in a particular course.

5. How to Use the Learning Center Instructor Guide (Figure III-43)

MODULE (Number)
LESSON TOPIC (Number)

JOB PROGRAM

FOR

LESSON TOPIC

(LESSON TOPIC TITLE)

The JOB PROGRAM is designed for use by the student in Lab/Shop activities.

Format for Job Plan will include:

1. Learning Objectives: List the Skill-type Learning Objectives to be achieved by student in the Lab/Shop activities.

2. Introduction: Provide a brief statement of Purpose, Scope, Value of Lab/Shop Activity.

3. References: Required for Lab/Shop Activity such as Tech Pubs, etc.

4. Equipment and Materials: Test equipment, tools, reusable materials, expendable materials where located, and how obtained and checked in at the end of activity.

5. Safety Precautions:

6. Procedural Steps in Lab/Shop Activity to be performed: Sequenced as intended for optimum performance; providing intermediate check points for approval/check-off by Lab/Shop Learning Center Instructor.

(NOTE: All performance tests must be successfully completed by ALL students.)

Figure III-40.--Job Program Format.

(Security CLASSIFICATION if Classified)

LEARNING CENTER INSTRUCTOR GUIDE

FOR

(Complete Course Title - ALL CAPS)

(Course Identification Number)

PREPARED BY

(Training Activity Preparing the Learning Center Instructor Guide)

PREPARED FOR

(Curriculum Approval Authority)

(Date)

Figure III-41.--Cover Page for Learning Center Instructor Guide.

TABLE OF CONTENTS

PAGE

Figure III-42.--Table of Contents Format

HOW TO USE LEARNING CENTER INSTRUCTOR GUIDE

(This publication) has been prepared for your use while assigned duties as a Learning Center Instructor for the ______________________________ Course. The Learning Center Instructor Guide is designed to supplement learning center instructor training, by providing practical information for both new and experienced Learning Center Instructors concerning role/function, duties and responsibilities in the INDIVIDUALIZED learning environment. Additionally, the Learning Center Instructor Guide contains Remediation Guides for your use as a Learning Center Instructor to determine/prescribe remedial instruction for the student at both the Lesson and Module level.

Figure III-43.--How to Use Learning Center Instructor Guide Format

. The Learning Center Instructor -- Duties and Responsibilities. This is the second major element of the Learning Center Instructor Guide. It should inform LCI's of their various functions, duties, and responsibilities in an IMI or CMI course. A description of each follows:

ROLE OF THE LEARNING CENTER INSTRUCTOR. The LCI's role is to direct the operation of a self-paced instructional program (in his assigned area) and to supervise the progress of students through the course.

FUNCTIONS OF A LEARNING CENTER INSTRUCTOR. The individual Learning Center Instructor can be designated a Learning Center Instructor (LCI) with an appropriate functional indicator as follows:

LCI = Learning Center Instructor (Instructing) whose primary responsibility is to students who are in study carrels or audiovisual carrels.

LCI(L/S) = Learning Center Instructor (Lab/Shop) whose primary responsibility is to supervise students performing Lab/Shop activities.

LCI(C) = Learning Center Instructor (Counseling) whose primary responsibility, based on prerequisite background courses and capability, is to provide individual counseling services to students having problems - Academic, personal, disciplinary, etc.

LCI(T/R) = Learning Center Instructor (Test & Records) whose primary function is to maintain student progress records; issue, administer and score tests; and assist in determining remediation plans for individual students.

LCS = Learning Center Supervisor. It is important to use this term only for the LCI placed in charge of the LCI's and the overall operation of a learning center.

DUTIES AND RESPONSIBILITIES OF LEARNING CENTER INSTRUCTORS (IMI and CMI):

LCI's are responsible for the following:

1. Prepare for Incoming Students

   a. Prepare carrel, supplying necessary hardware and software materials. If certain students (or carrels) are specifically assigned to a particular learning center instructor, that information should be made available to the incoming student by posting the learning center instructor's name in the carrel.

b. Complete administrative preparations and conduct enrollment procedures associated with the arrival of the student.

2. Conduct Student Orientation

   a. Establish rapport with the student.

   b. Orient the student to the self-paced system of learning.

   c. Instruct the student in the use of necessary materials.

3. Administer the Instructional Activities Performed by the Student

   a. Complete information forms and questionnaires.

   b. Complete pretests (as applicable).

   c. Demonstrate use of trainer guide to student.

   d. Complete instructional modules, progress checks, enrichment materials, etc.

   e. Complete module tests.

   f. Complete remedial instruction as required.

   g. Perform laboratory/shop procedures.

   h. Complete performance tests.

   i. Counsel students.

4. Evaluate Students' Performance

   a. Maintain close liaison with each student for whom you are responsible.

b. Evaluate, observe, and counsel students about attitude, work habits, etc.

c. Direct and evaluate lab/shop performance.

d. Maintain progress record of each student's achievement (IMI).

5. Measure Student Achievement and Provision for Remediation as Required

a. Administer tests; review and record results (IMI).

b. Evaluate student's progress and review weak or problem areas (IMI).

c. Assist students with academic problems; recognize presence of non-academic problems (personal, disciplinary, etc.)

d. Prescribe and direct remedial instruction (as required); evaluate results (IMI).

6. Provide for the Student Counseling

a. Determine the type of counseling required by the student (academic, personal, disciplinary, etc.).

b. Give counseling services to individual students referred by the LCI(I).

c. Maintain appropriate records of counseling for each student counseled.

d. Perform followup action indicated by the LCI(C).

7. Conduct Procedures Associated with Student Course Completion

a. Provide inputs to and/or complete records of student progress.

b. Ensure that students have turned in all materials and parts/equipment checked out.

. Student Remediation Guides for Use by Learning Center Instructors (Figure III-44). Student Remediation Guides are the third major element of an LCI Guide. Based on a student's performance on a Module Progress Test, a remediation plan will be prepared for the student by the Learning Center Instructor using the Student Remediation Guides (IMI Operation). The module test is composed of test items specifically designed to measure student achievement of the learning objectives of all lesson topics contained in the module. The module test items, which are grouped on the test according to the lesson topics in the module, must be marked with a code number to identify them with the learning objective whose achievement the test items are designed to measure. Since each learning objective is tied directly to a lesson topic within a module, the module test item must have a three-part code number to identify it as follows:

PART ONE must correspond to the module number.

PART TWO will identify the lesson topic number.

PART THREE will represent the number of the lesson topic learning objective whose achievement the module test item is designed to measure.

The Student Remediation Guide shall have as a heading the applicable module title, module number, and lesson topic number. Following the heading will be a numbered list of the learning objectives for the lesson topic. This list shall follow the same numbering system as that presented in the module booklet for the lesson topic. Test [illegible] numbers are [illegible]d in the "Module Test Items" [illegible] left-[illegible]d side of the form. There

are usually several alternate tests for the same module, so the test item numbers are placed accordingly. The number of the applicable learning objective is entered in the next column. The remainder of the form consists of columns to indicate the types of testing situations, instructional materials of various media, and enrichment materials.

Space provided at the bottom of each remediation guide permits the individual learning center instructor to add notes that facilitate optimum use of the guide.

The student remediation guide for a particular lesson topic will, therefore, provide the learning center instructor with the following information for use in planning/prescribing a remedial instructional plan for the individual student based on incorrect responses to test items on the module test:

1. Module Title

2. Module Number

3. Lesson Topic Number

4. Numbered List of Lesson Topic Learning Objectives

5. Numbers of test items from each form of module test designed to measure student achievement of learning objectives of particular lesson topic indicated; test item numbers for groups from each form of module test placed in separate columns but in parallel arrangement.

6. Number correlation of module test items with lesson topic learning objectives.

7. Indication of types of testing situations built into the course to test that particular lesson topic learning objective.

MODULE TITLE MODULE NUMBER LESSON TOPIC NUMBER

LEARNING OBJECTIVES FOR LESSON TOPIC NUMBER ______________

1. ____

____

2. ____

____

3. ____(etc)____________________________________

MODULE TEST ITEMS				ACHIEVEMENT MEASURED BY			INSTRUCTIONAL MATERIAL (MEDIA)							ENRICHMENT MATERIALS		
TEST #1	TEST #2	TEST #3	Lesson Topic Learning Objective Number	Knowledge Test Item Number	Performance Test Item Number	Progress Check Item Number	Lesson Topic Summary Page	Lesson Topic Programmed Instr. Pages - Frames	Lesson Topic Narrative Pages	Sound/Slide Program	Super-8 Movie Film	Job Program (Job Sheet)	Other	Textbooks	Navy Publications	Technical Publications

LEARNING CENTER INSTRUCTOR'S NOTES:

Figure III-44.--Learning Center Instructor's/Student Remediation Guide Format.

8. Listing of all available instructional materials (media) identified as to page number, frame number(s) for PI, test item number and other testing media used to measure that learning objective.

The information thus provided--one remediation guide for each lesson topic of each module in approved form/format--will permit more consistent remediation plans to be developed under IMI operation and will provide the basis for coding/programming the necessary information into a digital computer when an individualized course is converted from IMI to CMI operation. The learning center instructor student remediation guides shall be prepared and kept current, regardless of whether IMI or CMI operation is used because current guides for student remediation will provide an important link in the chain that forms the Instructional Management Plan. (See Section 3.2.2.)

3.6.4 Testing in Self-Paced Courses

Section 2.2 discusses developing test items for both group-paced courses and self-paced courses. This section discusses those aspects of testing which are unique to self-paced courses.

There are five types (or levels) of testing in self-paced courses. These are (1) Pretests, (2) Progress Checks, (3) Progress Tests, (4) Comprehensive Within-Course Tests, (5) Final Comprehensive Tests. Each of these types is discussed below:

3.6.4.1 <u>Pretests.</u> These are described in Section 2.2.

3.6.4.2 <u>Progress Checks.</u> The Progress Check is a "self-administered," "self-scored" criterion test which measures achievement of all lesson topic learning objectives. A checklist for determining the adequacy of Progress Checks is provided in Section 3.6.2.1.

3.6.4.3 Module Progress Tests. Module Progress Tests are normally the first LCI or computer evaluated tests of a students' achievement of Lesson Topic learning objectives. Module tests are composed of test items specifically designed to measure student achievement of all the learning objectives contained in the module. They are administered when the student has completed his study of the module instructional materials (normally 2 - 7 hours) and has self-remediated by means of lesson topic progress checks (self-tests).

In some cases, a student may elect to take the module test after he examines the progress check(s) and determines that he knows the material (without actually going through the material). Additionally, and most importantly, module tests provide the basis for making remedial assignments so that material not learned adequately the first time can be restudied. Module tests are usually not a basis for the assignment of grades, but are a valid indication of the need for additional study and/or practice in those areas where the criterion was not met. Each test item on a module test must be parallel to and consistent with its corresponding progress check item.

3.6.4.4. Comprehensive Within-Course Test. These tests are designed to measure direct achievement of specified terminal and enabling objectives. They are administered at selected intervals and measure the student's retention of several modules of instruction.

.6.4.5 Final Comprehensive Test. Final comprehensive tests will be administered to determine whether the terminal objectives have been and are still attained at the completion of instruction.

3.6.5 The Learning Center

The typical Learning Center will normally contain the functional areas shown in Figure III-45. The learning center is the focal point for all student learning activities and usually is

established as the permanent "home" location for the students while in the school.

Learning Centers are designed to provide the quiet study environment appropriate for learning in a self-paced course. Individual study carrels, which contain written instructional materials, tests, and other course materials, are assigned to each student upon registration in the course. Testing is conducted either in the students' study carrels, in an area set aside within the learning center, or in a special center dedicated to testing, depending upon physical constraints and student management controls desired within the individual school. Students use audiovisual materials in either special-purpose carrels or in their assigned carrels, depending upon equipment constraints.

3.6.6 Student Acceleration

Student acceleration in self-paced courses is based upon mastery of sets of learning objectives as measured by progress tests. This acceleration is on a module-by-module basis. If acceleration is based on the evaluation of a course criterion-referenced pretest, all course terminal objectives must be tested as on corresponding progress or module tests.

3.6.7 CMI/IMI Progress Tracking

Tracking student progress in an IMI or CMI course is a key element in forming realistic management policies and procedures for identifying and resolving problems with deficient students and for implementing student incentive programs. The following paragraphs describe CMI timekeeping. Ideally, an IMI course would use similar procedures for this purpose. However, it is realized that, without computer support, such a sophisticated tracking system is not possible. However, designers of IMI courses are encouraged to use the CMI system as a model and incorporate as many of its features as possible.

3.6.7.1 CMI Timekeeping. Tracking of individual student progress within the CMI system

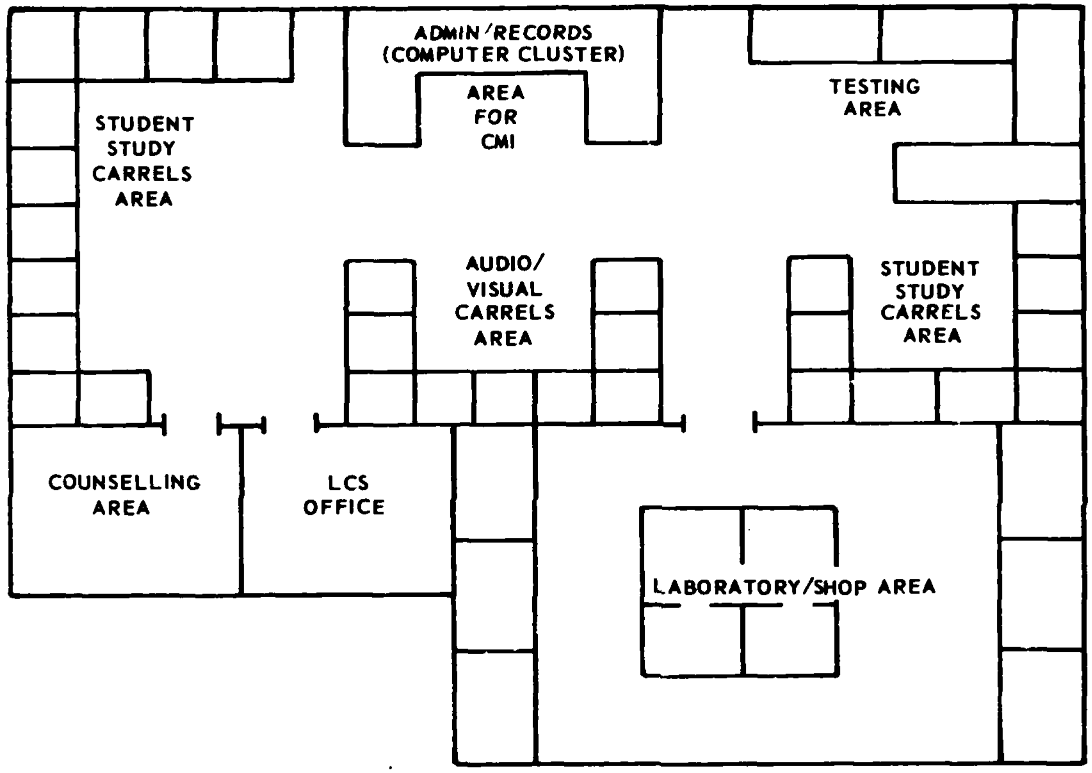
is based upon the time taken to reach criterion on a particular module. Contact time for an individual student is based upon the time established as the length of the normal training day for the learning complex in which the student is registered. Accounting for extra study time and time away from the learning center is done through individual transactions for the particular student as required. Contact time for any module thus becomes the time spent in the assigned module during the regular training day minus any lost time entered plus any special study time accumulated while the student was assigned the module.

3.6.7.2 Exception to the Regular Training Day. Individual student timekeeping is based on the times established to define the normal training for the complex in which the student is registered. The following paragraphs describe procedures to be followed when a student's training extends beyond the normal training day or when the student is away from training during the normal training hours.

. Supervised Remedial Study. When students enrolled in a CMI course do not make adequate progress toward course completion, they should be provided with the Quiet Study, Night School or Supervised Remedial Study facilities necessary to extend their normal training day. This extension of the training day must allow continued access to a classroom for test evaluation and to laboratory or shop spaces for the normal sequence of practical work and performance testing. It is essential that each student's time accrued in extra study in a supervised remedial study environment be entered into the appropriate CMI system student records to ensure that course and module completion times are accurately reflected. To accomplish this, the student should be entered into Special Study at the beginning of his extra study session and removed from extra study at the time he leaves the session. Specific instructions for entering students into and removing students from extra study sessions are provided in the CMI System user documentation.

Failure to account for all time spent in extra study sessions will (1) compound any existing problem in progress analysis for current students, (2) weaken course management potential for future students, and (3) serve to preclude CMI data resulting in an accurate reflection of course length. For accounting purposes on the CMI progress roster, time spent in extra study is considered to be extra effort expended and is counted as a positive factor serving to improve the student's progress rate. Failure to account for extra study time will result in inaccurate data (i.e., times that are unrealistically short). Such practices will also make course contact time appear to be shorter than the actual time being spent by students and, thus, by instructors also.

. Student Lost Time Modifications. If, for any reason, a student is absent from his learning center for a period in excess of twenty minutes, a lost time modification (inactive time update) must be made. The lost time may be accounted for by (1) entering a "suspend" transaction at the time the student leaves the learning center and a "clear" transaction upon his return or (2) entering a lost time modification for the amount of time spent away from training immediately upon his return to the learning center. When an unscheduled event occurs causing an entire learning complex to suspend operation during the hours established as the normal training day, one transaction modifying time for the entire complex will be made prior to submission of any assignments (including learning center instructor inputs) for evaluation.



NOTE: Spaces in addition to the Learning Center spaces will be provided for normal administrative functions, Curriculum Evaluation & Improvement (CE&I), etc.

Figure III-45.--Learning Center.

3.7 VALIDATE INSTRUCTION

The validation process is a critical step in the development of lesson materials. The question to be asked is, "How can we be certain that the instruction works?" The only acceptable way to do this is to measure student performance. If the students learn the specified skill, task, or knowledge as a result of the instruction, then it is valid; if the students do not learn as specified in the learning objective, the instruction is not valid and must be revised. Validation can be compared to the testing process on a new piece of equipment. If particular components of the equipment malfunction repeatedly, then this indicates a problem that must be corrected if the equipment is to perform properly. By the same token, if the students fail to master a particular segment of instruction, a
10 problem must be corrected.

Validation involves two very important concepts which must be kept in mind. First, validation is an ongoing process. As soon as materials have been gathered and/or developed for a given lesson, validation begins. The first lesson completed is NOT put on hold status as far as validation is concerned until all lessons are developed; rather each lesson or group of lessons is tested as soon as possible. Second, the instructional developer must plan for validation. It takes time to train an instructor, develop student feedback sheets, arrange for students with appropriate prerequisites, etc. Without proper planning, validation is compromised and course implementation may be negatively impacted.

3.7.1 How to Conduct Validation

Validation is accomplished by completing the following steps:

3.7.1.1 Internal Review. Each lesson or segment of the course is reviewed as soon as it is developed. The rough draft is reviewed by subject matter experts and curriculum designers for technical accuracy and completeness. The reviewer should have available a list of the lesson's

learning objectives and their criterion-referenced test items. As the rough draft materials are evaluated, questions such as the following should be asked:

1. Is the content accurate?

2. Is the material presented in a logical sequence?

3. Does the lead-in information motivate the student to pursue the material?

4. Do the teaching-learning activities encourage productive learning?

5. Is the material written in a manner to allow maximum student participation?

6. Is there opportunity for review and practice?

7. How effectively does the material teach behaviors specified in the learning objectives?

8. Does the test measure the behavior as specified in the learning objectives?

Suggestions or questions provided by the reviewer should cite specifically what is being commented on and its specific location. Once the review is completed, findings should be discussed with subject matter experts, education specialists, or others to correct any discrepancies. The internal review does not determine validity of the course material. It does, however, identify problem areas and suggest alternatives.

3.7.1.2 <u>Individual Trials.</u> Informal, individual trials on rough draft materials for each lesson will take place to identify gross deficiencies in the lesson materials "before" expensive final draft materials are produced. In other words, these trials are a "de-bug" routine which should help identify such things as where more practice or a definition is needed whether media included is adequate and whether instructor

guides or student study booklets are complete. Since this is probably the first time students will actually take the test items developed for a lesson, the informal trial may also identify problem test items.

Students must be selected carefully for the informal trials. They should meet all entry level requirements as well as have the necessary prerequisite skills and knowledges. In many instances, this may require that segments of instruction, i.e., consecutive lessons, be validated at one time so that students can be taught the prerequisite skills and knowledges.

Individual, informal trials are conducted and materials revised based on student performance until all gross problems are resolved. For each, the instructional developer should sit down with the student and go through the lesson presentation. As students ask questions, make mistakes, or seem confused, the curriculum designer should try to determine the cause and note it so that appropriate revisions to lesson materials can be made. Students should be told beforehand that they are helping to locate problem areas in the course materials and that any errors or difficulty they may have do not reflect on their ability.

The individual trials should be conducted as follows:

1. Administer Pretests. Pretests are given to students to determine how much they know before being exposed to the instruction. The scores made on the pretest are later compared with scores made on posttests to ascertain what effect the instructional materials had on student performance.

Pretests developed for validation purposes are made up of the post test items that address both enabling and terminal objectives. For validation purposes, however, it may be helpful in identifying weaknesses to add test items to both pre- and posttests which would be diagnostic in nature and therefore help to locate problem spots in the instructional materials.

2. Administer Instructional Materials. Observe the students' performances as they complete the lesson and keep track of the time it takes, the questions asked, and any difficulties observed.

3. Administer Posttest Items. This will determine how much the students learned from the instructional materials. The results will be recorded for each test item. This information will be used to identify strengths and weaknesses in the course and to provide a basis for making revisions.

4. Administer Student Feedback Sheets. This is the students' opportunity to suggest how to make instructional materials more effective. As such, the feedback sheet should be structured so that students' responses are channeled yet flexible so that open ended responses are allowed.

5. Revise the Instructional Materials. Evaluate all data: test scores and instructor and student comments. Then make the revisions required. When all major deficiencies have been corrected and revalidated, the individual trials are concluded.

3.7.1.3 Group Trials. Validation through group trials of each lesson or group of dependent lessons should take place. After completing individual trials, most of the gross deficiencies have been identified and the instruction revised accordingly. Now, in group trials, a smoother version of the instruction is tried on groups of students. A minimum of six students should be used for each group trial. As with individual trials, it is very important to select students that are representative of the target population to try the instructional materials and to select students that have the proper prerequisites. The steps for conducting group trials are the same steps as were followed during the individual trials with one major exception: this time, there is only one observer to six or more students. As they go through the instruction they are not interrupted; they continue through it as would a

normal class. Only upon completion of the lesson materials may students be asked such things as why they missed certain items, did the movie keep their interest, were there enough practice items.

Group trials are very important. They give an indication of whether or not students can meet standards set during the design of the instruction. With group trials, the instructional designer can begin to see how the pieces work together to make the lesson; whether the transition between the lecture and the movie is smooth; whether having 25 students practice a skill at agiven time is going to require the assistance of another instructor; how long it takes to move students through a given segment of instruction. From these observations, revisions are made to the instructional materials. Then these revised materials are tried on another group of students until the instuctional developers are satisfied that the instruction teaches the objective to the standard required.

3.7.1.4 Operational Validation. Validation of a new or revised course will be conducted in the schoolhouse environment using the school's normal student population. The REASONS for conducting the operational validation are:

1. Instructional materials must be evaluated as an integral part of a total system. Until now, individual and group trials validated portions of instructional material in an isolated environment.

2. Analysis of data from this larger sample will provide a solid basis for final revision and refinement of the course. Data gathered at this point will provide feedback concerning the adequacy of the learning analysis, learning objectives, criterion tests, and instructional materials. If students fail to meet the standards of the terminal objectives, reassessment of each of these procedures and products of the course design and development processes shall be scrutinized.

3. An operational trial provides an opportunity to work out administrative, equipment, facility, or any other implementation problems which may cause trouble later.

The STEPS for completing operational validation are:

1. Review of Material by Functional Command. The functional command will review a cross-section of all instructional materials for content, technical accuracy, and format. These will include instructor guides, student study guides, remediation guides, media, student study booklets and laboratory guides. Discrepancies noted by the functional command will be discussed with the curriculum designer.

2. Administer Pretests, Instructional Materials, and Post Tests. As with both individual and group trials, it is absolutely necessary to have students with the appropriate entry level; without this, validation results are contaminated.

In order for operational validation to take place, all instructional materials must be in place at the appropriate time. This means that advanced planning is required to ensure that printed materials are delivered on time, training devices and training aids are on site, the facilities are prepared; i.e., electrical outlets are available, desks or carrels are in place, training devices are installed, etc., and instructors are trained.

3. Administer Student and Instructor Feedback Sheets.

4. Analyze Results and Display/Present Data to Approval Authority. After administering all the tests, instruction, and feedback sheets, the results must be analyzed and displayed for submission to the approval authority. Prior to operational validation a validation standard was set. At this time, the validation test results are compared with the validation standard. If the standard was not reached, the curriculum designer

should look carefully at the instructional materials, equipments, and management documents to identify where the problems lie and what action should be taken to remedy the problems. Later in this section, setting standards and displaying data will be discussed.

Internal Review, Informal Trials, Group Trials and Operational Validation are the four steps for validating instructional materials. Ideally, materials would be validated using all four methods; however, resource constraints often prohibit doing this. Therefore, when it is impossible to perform both individual and small group trials due to unavailability of students or equipment, some concessions must be made. As a minimum, all materials will be validated through the internal review process, individual or group trials, and operational validation. When concessions must be made either individual or small group trials will be run, but both will not be required. To define the strategy which will be used to validate instructional materials for a given course, a Validation Plan will be completed and submitted to the curriculum approval authority.

3.7.2 Validation Plan

A Validation Plan will include each of the following components (See sample Validation Plan, Figure III-46):

1. Purpose. Describe why and for what course the Validation Plan has been prepared.

2. Background. Describes the tasking (i.e., who and what was tasked to be developed) and any major decisions that were made which affect the validation.

3. Prevalidation. Describes who will conduct internal review.

4. Informal/Group Trials. Describes the students who will be used; any validation standards that may apply; and any constraints on conducting the required trials.

5. Operational Trial. Describes who will conduct the operational trial, who will instruct, how students will be cycled through the course, and rationale for decisions made, if not otherwise obvious.

6. Judgment Criteria. Describes the makeup of the pre- and post-tests and what will be done if there is no significant gain in student performance as a result of the instruction. This section also describes the statistical analysis which will be conducted to determine whether significant gain has been achieved.

7. Standards. Describes what the standards are for operational validation, and, if different, the standards that will be used by the approval authority to accept or reject the course. Also, the section will include what will be done in the event that standards are not met by students.

8. Remediation. Describes how remediation will be handled for informal and group trials as well as operational validation.

9 Instructor Training. Describes the instructor training program that will be conducted for all instructors involved in any of the validation stages.

10. Student and Instructor Feedback Sheets. Attach copies of all feedback sheets which will be used during validation.

11. Display Format. Attach a sample of how the results of the statistical analysis will be displayed for review.

Once instructional materials are complete, the validation plan is approved by the curriculum approval authority, and the instructors are trained, validation can begin and must be conducted in accordance with the validation plan. Any changes to the validation plan made during validation should be approved by the curriculum approval authority and documented in the audit trail.

3.7.3 Analysis and Display of Raw Data

Upon completion of operational validation, raw data must be analyzed and displayed. The analysis of data is done for two reasons: first, to determine that students in fact achieve the objectives to the standard specified; and second, to identify where any problems lie in the instructional materials. Determining that students achieve the objectives to the standard set forth in the Validation Plan is simply a matter of scoring the tests, identifying how many students passed, and then comparing that with the valdiation standard.

To further identify where any problems lie in the instructional material, an item analysis should be performed. At a minimum, the item analysis will include two steps: determining P-Values (or proportion passing) and for those items having a low P-Value, analyzing the alternatives selected by students if multiple choice questions are used; or analyzing the errors made by students for other test item formats.

3.7.3.1 Displaying the Data. Data can be displayed in a variety of ways as long as it is understandable. The following illustrates an acceptable display.

OBJ #
2.4.1.3

TEST QUES #	PRE-TEST										POST-TEST										P-VALUE	
	Student #										Student #										PRE	POST
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10		
1	X		X	X	X		X		X	X				X						X	.3	.80
2	X	X	X	X	X	X	X	X			X							X			.2	.80
3	X		X				X														.7	1.00
4	X	X	X			X	X		X												.4	1.00
5		X	X	X	X		X	X	X		X						X	X			.3	.70

In the example above, the x's indicate incorrect responses. From this display, one can readily see the gain between pre- and post-test performance, and on which items, if any, there are problems. It is not necessary to display the analysis of multiple choice alternatives here.

Also, note in the example that test question number 3 was answered correctly by 7 out of 10 students on the pretest and by all 10 students on the posttest. Either the test question is a "give-away" or most students already possessed the knowledge prior to the instruction. In any case, this matter requires further investigation. The other four test items and their associated instructional materials appear sound because of the low performance by students on the pretest and the relatively high performance on the posttest.

3.7.3.2 P-Values. P-Values determine the simple difficulty of a test item. The P-Value represents the proportion of students who answered the item correctly. For criterion referenced tests, the higher the P-Value, the better the item.

To determine the P-Value of a given item, divide the number of students who answered the item correctly by the number of students who attempted it.

$$\text{Number of students who attempted the item}\ \overline{\smash{)}\ \text{Number of students who answered item correctly}}\quad \text{(quotient: . P-Value)}$$

For example, if 100 students tried an item and 90 students answered it correctly, the item would have a P-Value of .90.

P-Value

$$\begin{array}{r} .90 \\ 100\,\overline{)\,90.00} \end{array}$$

Number of students who attempted the item

Number of students who answered the item correctly

If 38 students attempt an item and 15 answer it correctly, the P-Value would be .39.

P-Value

$$\begin{array}{r} .39 \\ 38\,\overline{)\,15.00} \\ \underline{11\ 4} \\ 3\ 60 \\ \underline{3\ 42} \\ 18 \end{array}$$

Number of students attempting item

Number of students answering item correctly

The P-Value of a test item must be judged in the context of the material. For very difficult material, a P-Value of .70 might be adequate, while for more simple material, P-Values should cluster at around .90 or better.

3.7.3.3 <u>Analyzing an Item When the P-Value is Too Low.</u> Once the P-Value has been analyzed and a determination has been made that a problem exists (i.e., the P-Value is too low given the material or the criterion exists that students must know this information regardless of how difficult it is), one must look further to identify whether the problem lies with the test item or with the instructional materials.

To make the determination whether a problem lies with the instructional materials or the test items, an analysis of test item alternatives is advised. If the questions are multiple choice, this would involve looking at each test item which had an inadequate P-Value and counting how many students selected each distractor. In other

words, if 50 students attempted an item, how many of them selected alternative A, how many selected alternatives B, C, and so forth. From this, we can get an idea where the problem lies. Look at some examples:

. Example 1

50 students attempted test item #1.

Number of students	A	B	C	D
	[alternatives; C is correct response			
50	7	38	3	2
	[number of students responding to each alternative			

There could be several reasons why alternative B was selected:

1. The information given students in the presentation was incorrect. In this case, the IG study booklet, etc. must be corrected.

2. The answer is keyed incorrectly; in actuality alternative B is correct. Therefore, the answer key must be corrected.

3. The test item is worded such that alternative B seems to be the correct item. Here, the test item must be reworded.

. Example 2

The same 50 students attempted test item #2.

Number of students	A	B	C	D
	[alternative A is the correct response			
50	50	0	0	0
	[number of students responding to each alternative			

Although the P-Value here would be very high (1.0), the question may be a give-away. It should be evaluated carefully to determine if 100% of students are likely to know the answer, if the question is answered by an earlier question, or if the question is worded in such a way that it gives away the answer.

. Example 3

50 students attempted test item #3.

Number of students	A	B	C	D
	[alternative D is the correct response			
50	6	12	19	13
	[number of students responding to each alternative			

Here, students have not jumped on any one alternative. The reason for this may be that in the alternatives, there was no clear distinction as to which was the correct response. Another possibility is that the question was not addressed adequately within the instruction.

The point of all the examples is that by looking closely at the students' responses to the questions, insight may be obtained on just where a problem may lie. Once the source of the problem is identified, the remedy is usually simple.

INTERNAL VALIDATION PLAN

FOR AIRMAN APPRENTICE (4.0 WEEKS)

1. PURPOSE

The purpose of this validation plan is to establish policies which will be used to validate the Airman Apprentice curriculum. "Validation" as used in this context has a dual connotation. On one hand, validation implies a debugging of the course, i.e., identification of where interaction between the instructional materials and the students may break down to the extent that the students do not learn effectively or efficiently. On the other hand, validation is also a systematic demonstration to higher authority that the newly developed curriculum allows students to adequately achieve instructional objectives.

2. BACKGROUND

In January 1979, the Naval Education and Training Program Development Center Detachment (NETPDCD) was tasked by Chief of Naval Education and Training to develop an expanded four week Airman Apprentice curriculum. Lesson topics and guidance as to lesson content were provided as part of the tasking. Subsequently, NETPDCD wrote objectives and test items as well as prepared written, audio and visual materials to be used in the classroom.

3. PRE-VALIDATION

Prior to actual validation, an internal review of curriculum material will be conducted by the following individuals.

a. Author

Figure III-46.--Sample Validation Plan (Page 1 of 13)

b. Project Manager, Assistant Project Manager, or team member designated by the Project Manager, who will apply principles contained in the Instructional Quality Inventory (IQI)

c. Subject matter expert who will review for technical accuracy

d. Editorial Assistant

4. INDIVIDUAL AND GROUP TRIALS

a. Individual Trials. A trial will be conducted for each segment of the material. Administration of the instructional material will be on a one-on-one basis in order to facilitate informal exchange of information between the author and the student or subject. This trial will be conducted three times. The first time the author will conduct a trial without an observer. The second and third times an observer will be available to give feedback and impressions of the observation. The observer will come from Project Team III and will be arranged for through the Project Manager.

b. Small Group Trials. (5 students) A small group trial will be conducted for each segment of the material once. If the students do not meet the criterion of the Lesson Objectives for the small group trial, then a second small group trial will be conducted after an investigation is made regarding why they failed to meet criterion. During a small group trial an instructor from the Airman Apprentice Training Department will conduct the trial. The Project Manager or his/her appointed representatives will arrange for the instructor to conduct the small group trials. The author of the lesson will be in the classroom to act as an observer during these small group trials. Individuals and small groups of students will be selected to try out the instructional materials. The selected students must be a representative sample of the target population for which the instruction is being provided. This means that the students will:

Figure III-46.--Sample Validation Plan (Page 2 of 13)

(1) Have been tested on and successfully achieved the entry level requirements for learning the segments of instruction being validated.

(2) Have ASVAB scores which support the assumption of representativeness by not deviating significantly from: ----------------.

(3) Be in a hold status awaiting the formation of a new unit to begin the Airman Apprentice 2.4 week course.

(4) Have completed Student Background Sheets.

(5) Be from the Great Lakes site. The rationale is that current fiscal constraints indicate that a single sited validation is unavoidable. Based upon data collected by the Evaluator, it is understood that this is not the optimum. A letter incorporating these data is being forwarded to CNET (N-9). This letter will also request additional funds for validation at all three sites in order to establish the level of veracity of the curriculum in a Chicano and male/female environment.

5. OPERATIONAL TRIAL (Normal class size)

An operational trial will be conducted for a regularly scheduled, normal size class. At this time, the course will be taught in its entirety. The operational tryout will be conducted in the classroom setting at the ATD and will be conducted by an instructor just as if this was a class going through the curriculum for pre-fleet assignment. The sample being used for the operational tryout will graduate from the ATD at the completion of the validation if they meet criterion.

Students participating in the Operational Validation will meet the same criteria as outlined above for individual and group trials.

Figure III-46.--Sample Validation Plan (Page 3 of 13)

6. JUDGMENT CRITERIA

The basic pretest posttest (assessment of change) design will be used for all elements in paragraphs 4 and 5 above.

a. A pretest, designed to determine how much the students know prior to instruction, will consist of the same test items that will be utilized as a posttest. For the one-on-one trials, all of the test items which will be included as the posttest will be utilized as a pretest. For the small group trials, all of the items that will be involved on the small group posttest will be utilized as the pretest. Due to time constraints, the pretest for the operational tryout will be a sample from among posttest items based upon the criticality (standard) of the objective.

b. The posttest will consist of all items included on the actual course test(s) or a parallel form(s) of that test comprised of different, but equivalent, test items.

c. A detailed analysis will be conducted and the instructional material will be modified following the pre-posttest analysis unless BOTH of the following conditions prevail: (1) instruction causes significant positive change in the amount of material learned by the student; and (2) the student level of achievement increases from below criterion (established for each Lesson Terminal Objective) to above the criterion. The analysis will be conducted in accordance with procedures outlined in paragraph e. below.

Figure III-46.--Sample Validation Plan (Page 4 of 13)

d. If the pre-posttest analysis indicated no change in material learned or insufficient change, the following instructional materials will be analyzed and/or modified.

(1) Instructor Guide/curriculum

(2) Instructional sequence

(3) Audio visual material

(4) Student workbook

(5) Test questions

e. An item analysis will be conducted for the individual trials and small group trials by the author of the lesson. A formal item analysis (including a calculation of a difficulty index) will be conducted for the operational tryouts by the Evaluation Office. Results will be displayed as shown in enclosures (1) and (2).

f. Raw data for the formal item analysis and for the pre-posttest analysis for the operational tryout will be provided to the Evaluation Office on Op Scan answer sheets so that the evaluator will be able to conduct the item analysis addressed in sub-paragraph e. above. This analysis will be done in a timely manner to enable the developers to utilize the data in rewriting the curriculum.

7. STANDARDS

a. Criterion for successful performance for each Lesson Terminal Objective is indicated on the LOAW for each Lesson Terminal Objective. These standards were established by interviewing the SME assigned to the team who presented the education specialist interviewing him with his opinion of what the criterion should be for each Lesson Terminal Objective. The range of criterion for all Lesson Terminal Objectives is 62.5% to 80.0%.

Figure III-46.--Sample Validation Plan (Page 5 of 13)

b. Overall standards for acceptance by CNET have been established as being 90% of the operational tryout sample meeting criterion for each Lesson Terminal Objective.

c. In the event that standards are not met following the operational tryout, instructional materials will be analyzed as indicated in paragraph 6 above. The new material will be withdrawn from the schoolhouse and training based on the old course will be re-established during the necessary modification rework.

8. REMEDIATION

Students involved in one-on-one and small group trials will not be remediated as they will be returning to a unit which will be formed for the purpose of receiving instruction in the current 2.4 week curriculum. Students involved in the operational tryouts will be remediated via a computer assisted testing program which involves presenting test items to students and if incorrect answers are given a remediation loop is provided for, thereby providing the student with sufficient levels of remediation. This will be the means for remediation of operational tryouts sample.

9. INSTRUCTOR TRAINING

a. Instructors for the individual trials of the validation process will be education specialist/technicians who wrote the material. The reason for this is to enable the authors to establish, on a first hand basis, the errors or areas of problems within the instructional material which the author has written.

b. Instructors for the small group trials will be instructors who are currently on the podium at Great Lakes, ATD. These instructors will be given their IG, which they will be administering to the small group, at least 24 hours prior to the small group validation session.

Figure III-46.--Sample Validation Plan (Page 6 of 13)

The author and the instructor will go through the IG on a page by page basis and will "talk out" any problems. This introduction to the IG will enable the instructor to become familiar with the format and media involved in the IG he will be teaching. He also will be given the opportunity to practice the material -- using films, transparencies, sound slide programs, or whatever other media will be involved in a specific IG. These segments will be identified by the author at the time the instructor is given the IG. It will be stressed to the instructor that he must cover th IG in its entirety and not have the option of skipping items.

c. Instructors for the operational tryouts will be afforded the same type of training as discussed in sub-paragraph b. above.

10. STUDENT AND INSTRUCTOR FEEDBACK SHEETS

The following student and instructor feedback sheets will be completed and forwarded to the Evaluation Office for review.

a. Enclosure (3) will be completed by each student during orientation.

b. Enclosure (4) will be completed by each student at the end of a unit/module of instruction.

c. Enclosure (5) will be completed by the instructor upon completion of a unit/module.

11. DISPLAY FORMAT

Item analysis results will be displayed as shown in enclosure (1).

Figure III-46.--Sample Validation Plan (Page 7 of 13)

School/Course	Unit#	Module	Lssn.Tpc.	Lrn.Obj.#	Item	Original Date

Used On Exam.	No.	EXAMINATION ITEM	Date Rev.	Rev's. Initials
		This item suitable for comprehensive___ yes ___ no		

TEST ITEM RECORD

(continued)

Number Exam.	Ques.	Total Papers	ITEM CHOICE COUNT 1	2	3	4	5	%COR-RECT	?	OTHER

Enclosure 1

Figure III-46.--Sample Validation Plan (Page 8 of 13)

ITEM ANALYSIS WORKSHEET

Test Code	Date Admin.	Date Analyzed	Class No.	Total Cases

Item No.	ITEM RESPONSE COUNT					Percent Correct	P
	1	2	3	4	5		
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
24.							
25.							

Enclosure 2

Figure III-46.—Sample Validation Plan (Page 9 of 13)

BACKGROUND INFORMATION

1. Social Security Number: ______________ 2. Date: ____________

3. This course located at (check one): ( ) Great Lakes
( ) Orlando
( ) San Diego

4. Education: High School ____________ College ____________
(Number of years completed)

5. Time in Service: __________ __________
(Years) (Months)

6. Present Rate (check one): ( )
( )
( )
( ) Other ____________________
(Specify Rate)

7. Military Service Schools attended (list all and location):

____

____

____

DO NOT WRITE BELOW THIS LINE

ASVAB: ____________________

READING: ____________________

Enclosure 3

Figure III-46.--Sample Validation Plan (Page 10 of 13)

STUDENT FEEDBACK FORM

Name ____________________ Date ____________________

Social Sec. No. ____________ Unit/Module ______________

Please choose the best answer for each of the questions below and comment where you feel it is necessary.

1. The objectives of this unit/module were made clear at the beginning of the lesson.

   Yes ( ) COMMENT
   Somewhat ( )
   No ( )

2. How well did the unit/module teach the objectives?

   Very well ( ) COMMENT
   About average ( )
   Very poorly ( )

3. How hard to understand was the subject matter in this lesson?

   Not very hard ( ) COMMENT
   Fairly hard ( )
   Very hard ( )

4. The slides, transparancies, movies and/or class exercises helped me to understand the learning objectives of this lesson.

   Helped very much ( ) COMMENT
   Some help ( )
   Helped very little ( )

Enclosure 4

Figure III-46.--Sample Validation Plan (Page 11 of 13)

5. The lecture helped me to understand the learning objectives of this lesson.

Helped very much ( ) C
O
Some help ( ) M
M
Helped very little ( ) E
N
T

6. The amount of practice or drill in this lesson was:

Too much ( ) C
O
About right ( ) M
M
Too little ( ) E
N
T

7. How was the pace of the lesson?

Too fast ( ) C
O
About right ( ) M
M
Too slow ( ) E
N
T

8. Where did you first learn the material in this lesson?

( ) a. Before joining the Navy

( ) b. During Recruit Training

( ) c. During this class

( ) d. None of the above (explain please) ______________

____

9. Do you have any general comments about the overall lesson - how it could be made a better course?

____

____

____

____

Enclosure 4

Figure III-46.--Sample Validation Plan (Page 12 of 13)

INSTRUCTOR FEEDBACK FORM

Date: ______________	Great Lakes ( )
Instructor: ______________	Orlando ( )
Unit/Module: ______________	San Diego ( )
Lesson Began: ______________	Time for Breaks, etc. ______ (Minutes)
Lesson Ended: ______________	Total Time on Lesson ______ (Minutes)

Instructor Guide Comments:

Audio Visual Comments:

General Comments:

Enclosure 5

Figure III-46.--Sample Validation Plan (Page 13 of 13)

PHASE IV

IMPLEMENT

4.0 INTRODUCTION

Assuming the procedures given in the previous phases were followed correctly, a complete instructional package containing learning objectives, criterion-referenced tests, instructional materials, and an Instructional Management Plan will have been developed. In this phase, the procedures used in scheduling, instructing, and monitoring the course, and evaluating students and staff are specified. The rules and responsibilities of the Course Curriculum Model Manager (CCMM) and the Curriculum and Instructional Standards Offices (CISO) relative to implementing and managing instruction are addressed.

Required Documentation: Instructor Evaluations, Learning Center Instructor Evaluations, and Student Performance Records.

4.1 INSTRUCTIONAL MANAGEMENT

Instructional management procedures are used in organizing, controlling, and evaluating the delivery of instruction. These procedures are contained in the Instructional Management Plan, Curriculum Outline, Instructional Materials, and those instructions, manuals, and directions which spell out the duties of school supervisors, directors, and support personnel.

4.1.1 Training Pipeline Management

Pipeline Management involves the control and supervision of students through the training continuum. Pipeline time may be defined as the total time invested in training personnel once

they are designated students, including time to travel to the training activity, time awaiting instruction, time in actual training, and the time from termination of training until reporting to their ultimate duty station. Factors involved in an efficient pipeline are numerous, and all must be carefully monitored to provide the necessary accountability and maintain an uninterrupted flow of students. The primary means to record and monitor the pipeline status is the Navy Integrated Training and Resource Management System (NITRAS) described in the CNETINST 1510.1 Series.

The functional command or its designated representative is responsible for providing to NITRAS the course information required by the CNETINST 1510.1 Series. The basic course management data, projected training requirements and plans, and class schedule will be incorporated in the NITRAS Master Course Reference File (MCRF). The NITRAS Student Master File (SMF) will incorporate individual student data as specified in the SMF User's Manual. The Training Summary File (TSF) will incorporate information concerning fiscal year planned and actual student input to date. The TSF will also contain the average onboard student count for the month reported, students awaiting instruction and transfer, planned and actual attrition, and setbacks.

4.1.1.1 Determination of Convening Frequency and Scheduling of Class Convening Dates. The planned actual input is required to determine convening frequency. The planned annual input may be obtained from a Navy Training Plan (NTP) or from a NITRAS Master Course Reference File (MCRF) Report 1500.1003 or 1500.1071 based on Naval Military Personnel Command (NMPC) requirements. The functional command or its designated representative should strive to schedule the optimum number of classes to meet the planned annual input. The optimum convening frequency is that which is most efficient and economical in terms of instructor/resource utilization.

. Scheduling of class convening dates should be consistent from year to year to create a

regularity of pattern scheduling. National holidays will not be scheduled as convening dates nor as days of training. Graduations that coincide with Christmas-New Year holiday period may be accelerated, provided there is no degradation of training. Graduation will always occur on a normal training day.

. Class schedules should be constructed, whenever possible, to provide close scheduling of associated or follow-on courses in order to minimize awaiting instruction time.

4.1.1.2 Instructor and Training Support. The functional command or its designated representative is responsible for ensuring that instructor, support, and student billets are properly allocated. The Shore Requirements, Standards, and Manpower Planning System (SHORSTAMPS) is used to determine the total military and civilian manpower requirements for shore establishments. The Shore Required Operational Capability (SHOROC) subsystem is a detailed listing of required functions of an activity amplifying its mission, task, and function statement. SHOROC specifies tasks and defines how much, how long, and how well tasks are required to be performed based on the course Curriculum Outline. Instructor/student ratios determined by analyzing objectives within the Curriculum Outline are used in the instructor and training support computation specified in the SHORSTAMPS/SHOROC systems. The computation procedures are provided in CNETINST 5311.1 and its supporting instructions.

4.1.1.3 Student Quota Control. Once the planned annual input and class schedule appears in NITRAS, student quotas are allocated to meet the plan. The quota management authority (designated functional command) will provide, through NITRAS, quota assignments by class convening dates to most users. Foreign nationals, civilians, and contractor personnel with Navy sponsors are assigned as specific requests for class dates and numbers of quotas are received.

4.1.2 Catalog of Navy Training Courses (CANTRAC)

CANTRAC lists courses taught in Navy Schools and some other service courses that train Navy personnel. Pertinent management data and a course brief are provided on each of these courses. Input to CANTRAC is prepared by the functional command or its designated representative in accordance with CNETINST 1500.1; Subj: Catalog of Navy Training Courses (CANTRAC) NAVEDTRA 10500.

4.1.3 Facilities and Equipment

4.1.3.1 Resource Requirements Requests (RRR). The Program Objective Memorandum (POM) is the vehicle within the Navy wherein OPNAV sponsors annually inform the CNO of their unfunded resource requirements. The POM covers a five-year period. It is the responsibility of the functional command or its designated representative to prepare Resource Requirements Requests which inform the OPNAV sponsor of training resources to be included in the POM.

An RRR (CNET Form 1500/14) defines all resources required to support new or expanded training and education requirements. Because of its scope, the POM cycle dictates entry of requirements into the system at least two or three years ahead of the need. Such requirements as building construction or major training devices (simulators, for example) may take four to five years. Following initial entry into the system, continuous monitoring is recommended to ensure that equipment/facilities purchases are on track. The procedures for preparing the RRR are provided in CNETINST 7100.2 and in the RRR manual, CNET P1500/3.

4.1.3.2 Facilities Construction and Modification. The Shore Facilities Planning System (SFPS) is to assist commanding officers in the planning and development of facilities required to accomplish the assigned mission. Requests for facilities modifications are submitted in accordance with OPNAVINST 11010.1. A list of individual projects for correction of

facility deficiencies is published annually. Known as the Military Construction (MCON) Requirements List, it is verified by the activity, the NAVFAC Engineering Field Division, and the functional command.

4.1.4 Publication and Printing

The functional command or its designated representative is required to review all training material prior to printing. The review is to ensure an acceptable level of quality and pertinence to assigned training mission and tasks. The exchange of training materials between activities and other government agencies with similar function is recommended.

Estimates of printing costs will be provided to the functional command annually to ensure that needed materials will be available when required. For courses taught at multiple locations, the Course Curriculum Model Manager will be responsible for budgeting and printing requirements.

4.1.5 Accreditation

The goal of accreditation is to improve the quality of training in Naval Technical Schools. It is a process whereby the military training activity evaluates its performance against the standards of the regional accrediting agency. A vital part of the accreditation process is the extensive self-evaluation, the results of which are published by the training activity in a Self-Study report. Another important aspect is the evaluation by a comprehensive team of training experts appointed by the Accrediting Agency. In this process the school achieves improved quality throughout its operation. Even after accreditation is granted, an annual review and report are required of the activity to substantiate continued status.

CNET has promulgated policy and guidance regarding the accreditation of Navy technical schools in CNETINST 1500.15 Series. The functional command is tasked to appoint liaison individuals/points of contact, and to annually review and recommend activities for the accreditation process.

4.1.6 Mandatory Requirements for Properly Qualified School Staff

It is essential that all instructors, learning center instructors, and counselors be properly qualified and trained. It is the responsibility of the commanding officer to ensure that staff personnel meet the requirements outlined below for in-service improvement of instruction.

4.1.6.1 Instructor Training (IT) Requirements. All officer and enlisted personnel assigned by Naval Manpower and Personnel Command (NMPC) to Instructor or "I" billets are required to complete one of two courses before assuming their duties. Instructors who will serve in a self-paced environment must complete the Learning Center Instructor Course (CIN:A-012-0012). They must also complete the technical course of instruction in which they have been assigned as a Learning Center Instructor. Following an in-service training/qualifying period, and at the discretion of the commanding officer, they can be awarded NEC 9501. Instructors who will serve in a group-paced environment must successfully complete the Instructor Basic Course (CIN:A-012-0011), or an equivalent armed forces course which has been approved as a prerequisite for granting NEC 9502. These instructors will also take part in a qualification program at the training activity. They will be in a probationary status for a period to be determined by the commanding officer.

. RETRAINING. Instructors who are assigned from one "I" billet to another which requires a different prerequisite instructor training course shall complete the required course.

. REFRESHER TRAINING. Personnel returning for repeat tours of "I" billet duty and who have completed instructor training more than five years previous, will complete the respective prerequisite instructor training course. Previous graduates of the Learning Center Instructor Course (CIN:A-012-0012) may fulfill their training requirement by taking the course criterion-referenced tests and completing any

remedial work. Previous graduates of the Instructor Basic Course (CIN:A-012-0011) or an equivalent course, may fulfill their training requirement by successfully completing the course criterion-referenced tests and presenting at least one practice teaching lesson with a minimum grade of "satisfactory."

. IN-SERVICE TRAINING. All activities will provide a formal in-service training program monthly for instructional and supervisory personnel. In-service training may deal with, but is not limited to, such areas as student counseling, test construction, instructional techniques, or schoolhouse management procedures.

4.1.6.2 Instructor Evaluation. Evaluation of instructors and curriculum for the purpose of improving the quality of training shall be an ongoing process. Instructors (both group-paced and self-paced) shall be evaluated at least monthly during their initial six months of instructor duty and at least four times each year thereafter with approximately 90 days lapsing between each evaluation. More frequent evaluation is encouraged and is necessary when inadequate instruction is observed or determined from internal feedback. School Directors will prepare a quarterly schedule for evaluating all personnel in "I" billets within a school/course. A copy will be provided to the Curriculum and Instructional Standards Office (CISO) where it will be maintained. Evaluators will be designated by the School Director from Instructor-qualified officer and enlisted supervisory personnel, or school/course education and training specialists. Evaluations will also be conducted by CISO representatives and will be integrated into the school/course evaluation schedule. The critique of an instructor or learning center instructor being evaluated should be completed soon after the evaluation. It should be planned and carried out to minimize disruption of the instructional period.

. PROCEDURES FOR EVALUATION. The evaluator should:

1. Develop a relationship with instructors based on mutual respect and trust. This will help foster a cooperative atmosphere during evaluations and a receptiveness on the part of the instructor/learning center instructor to suggestions during followup critiques.

2. Review the course materials for the specific session to be observed.

3. Be aware during in-service training that the purpose of evaluations is to improve instruction.

4. Arrive before the learning session starts, locate a suitable place from which to observe; evaluate only that segment of the learning session actually observed.

5. Avoid conspicuous note taking.

6. Schedule a followup critique with the instructor or learning center instructor evaluated.

7. Provide the instructor or learning center instructor with a completed copy of the evaluation record.

8. Observe the instructor or learning center instructor in learning situations involving as many different methods/media as possible.

. TIMING THE EVALUATION. Evaluation of instruction can be conducted on a scheduled and/or unscheduled basis. Each of these procedures has its advantages and disadvantages. A scheduled evaluation allows the instructor to prepare himself for the evaluation. A scheduled evaluation also allows the instructor time to prepare a "show" that is not typical of usual performance. An unscheduled visit permits the evaluator to observe the instructor in a normal mode and can achieve a realistic appraisal of the instruction. However, an inexperienced instructor

or one lacking self-confidence may feel threatened at being evaluated and fail to perform as well as usual. There is always the possibility that an instructor will switch from usual performance to the accepted IT course approach for the benefit of the evaluation. Both scheduled and unscheduled evaluations should be carefully used to achieve the advantages of each. No instructor or learning center instructor should be evaluated during the first time teaching a topic.

. EVALUATION FORMS. There are two separate evaluation forms--one to evaluate instructors and one to evaluate learning center instructors. Both forms will be completed in duplicate. One copy will go to the individual as a basis for his or her personal instructor improvement plan and one copy will be forwarded to the CIS office (via the individual's training department).

When an instructor or learning center instructor is transferred outside the training command, the evaluation records will be destroyed.

. Instructor Evaluation Form (Figure IV-1). To evaluate the instructor on each element, the evaluator should observe the instructor for at least one complete lesson topic. The evaluator will use the top of the reverse side of the form to make comments and recommendations. After reviewing the written evaluation and the oral critique of the evaluator, the instructor will use the bottom of the reverse side of the form to outline an improvement plan (if necessary). This section will give the instructor's overall opinion of the evaluation and critique and will be a benchmark for the instructor to gauge professional growth.

INSTRUCTOR EVALUATION
CNET-GEN 1540/4 (Rev. 6-81) S/N 0107LLNF03721

NAME	RATE	UNIT/MODULE	DATE
COURSE TITLE	LESSON TOPIC TITLE		

EVALUATION ITEMS	YES	NO
1. LEARNING OBJECTIVES WERE:		
a. Provided		
b. Clarified/amplified as necessary		
c. Reinforced		
2. STUDENTS WERE MOTIVATED IN TERMS OF:		
a. How the material is to be used.		
b. Why the material should be learned.		
3. INSTRUCTOR ESTABLISHED A WORKING RELATIONSHIP WITH STUDENTS:		
a. Displayed name/introduced self		
b. Displayed course/unit/module name		
c. Created general and/or specific interest in subject		
d. Solicited class cooperation and involvment		
e. Displayed enthusiasm		
4. DID THE INSTRUCTOR		
a. Properly prepare for the lesson?		
b. Use the IG properly?		
c. Use media/materials to maximum advantage? (Including chalkboard)		
d. Check student comprehension?		
e. Use proper questioning techniques?		
f. Effectively/efficiently use time available?		
g. Maintain class control?		
h. Maintain student interest?		
i. Have sufficient voice variation?		
j. Pronounce words correctly?		
k. Use proper words and phrases?		
l. Avoid distracting mannerisms?		
m. Display proper military bearing?		
n. Use gestures effectively?		
o. Maintain proper eye contact?		
p. Display a positive attitude?		
q. Maintain proper instructor/student relationship?		
r. Adjust to extemporaneous learning situations?		
s. Summarize/critique the lesson properly?		
5. DID THE STUDENTS ACHIEVE THE LEARNING OBJECTIVES?		
6. EVALUATOR PREVIEWED THE IG FOR CURRENCY AND PERSONALIZATION?		

Figure IV-1.--Instructor Evaluation (Front).

CNET-GEN 1540/4 (Rev. 6-81) (Back) S/N 0107LLNF03721

EVALUATION *(Specific remarks are required to support rating other than "Adequate.")*

☐ OUTSTANDING ☐ GOOD ☐ ADEQUATE ☐ POOR ☐ UNSATISFACTORY

REMARKS *(Make specific, constructive comments)*

I certify that the instructor was critiqued immediately after evaluation.

SIGNATURE OF EVALUATOR	TYPED NAME AND TITLE	DATE

TO BE COMPLETED BY INSTRUCTOR

I HAVE BEEN CRITIQUED ON THIS EVALUATION. MY INSTRUCTOR IMPROVEMENT PLAN *(if necessary)* IS AS FOLLOWS:

SIGNATURE OF INSTRUCTOR	TYPED NAME AND TITLE	DATE

Figure IV-1.--Instructor Evaluation (Back).

. Learning Center Instructor Evaluation Form (Figure IV-2). Place a check in the appropriate block or column to indicate evaluation of each item. Some items require a subjective judgment by the evaluator; negative evaluation marks must be substantiated by definitive comments. Items not applicable or not observable during the actual evaluation period should be so marked. The evaluation form will assist both the evaluator and the learning center instructor in improving instruction.

4.1.6.3 Counseling. Staff members must be aware of their roles and responsibilities in the area of counseling. Academic counseling is done primarily by the instructor or learning center instructor and is restricted to helping the student understand the subject matter.

4.1.6.4 Student Problem Identification. Each training activity shall establish guidelines for the identification of students' difficulties. The following may serve as indicators of those difficulties:

. Discrepancy between a student's potential as measured by Armed Services Vocational Aptitude Battery (ASVAB) test scores and course pretest results and/or performance in the course.

. Significant trends toward reduced achievement of learning objectives not comparable to the difficulty of the technical material. Such decrease may not have reached the point of failure, but decreases from one progress test to the next should be examined for possible student difficulty.

. Significant change in a student's behavior, such as: repeated failure to prepare class assignments, excessive tardiness, increases in laboratory accidents, sluggishness in laboratory or shop performance, or sleeping in class.

. Review of student course critiques.

INSTRUCTOR EVALUATION
CNET-GEN 1540/4 (Rev. 6-81) S/N [illegible]

NAME	RATE	UNIT/MODULE	DATE
COURSE TITLE	LESSON TOPIC TITLE		

EVALUATION ITEMS	YES	NO
1. LEARNING OBJECTIVES WERE:		
a. Provided		
b. Clarified/amplified as necessary		
c. Reinforced		
2. STUDENTS WERE MOTIVATED IN TERMS OF:		
a. How the material is to be used.		
b. Why the material should be learned.		
3. INSTRUCTOR ESTABLISHED A WORKING RELATIONSHIP WITH STUDENTS:		
a. Displayed name/introduced self		
b. Displayed course/unit/module name		
c. Created general and/or specific interest in subject		
d. Solicited class cooperation and involvment		
e. Displayed enthusiasm		
4. DID THE INSTRUCTOR		
a. Properly prepare for the lesson?		
b. Use the IG properly?		
c. Use media/materials to maximum advantage? (Including chalkboard)		
d. Check student comprehension?		
e. Use proper questioning techniques?		
f. Effectively/efficiently use time available?		
g. Maintain class control?		
h. Maintain student interest?		
i. Have sufficient voice variation?		
j. Pronounce words correctly?		
k. Use proper words and phrases?		
l. Avoid distracting mannerisms?		
m. Display proper military bearing?		
n. Use gestures effectively?		
o. Maintain proper eye contact?		
p. Display a positive attitude?		
q. Maintain proper instructor/student relationship?		
r. Adjust to extemporaneous learning situations?		
s. Summarize/critique the lesson properly?		
5. DID THE STUDENTS ACHIEVE THE LEARNING OBJECTIVES?		
6. EVALUATOR PREVIEWED THE IG FOR CURRENCY AND PERSONALIZATION?		

Figure IV-2.--Learning Center Instructor Evaluation (Front).

CNET-GEN 1540/4 (Rev. 6-81) (Back)

EVALUATION (Specific remarks are required to support rating other than "Adequate.")

☐ OUTSTANDING ☐ GOOD ☐ ADEQUATE ☐ POOR ☐ UNSATISFACTORY

REMARKS (Make specific, constructive comments)

I certify that the instructor was critiqued immediately after evaluation.

SIGNATURE OF EVALUATOR	TYPED NAME AND TITLE	DATE

TO BE COMPLETED BY INSTRUCTOR

I HAVE BEEN CRITIQUED ON THIS EVALUATION. MY INSTRUCTOR IMPROVEMENT PLAN (IF NECESSARY) IS AS FOLLOWS:

SIGNATURE OF INSTRUCTOR	TYPED NAME AND TITLE	DATE

Figure IV-2.--Learning Center Instructor Evaluation (Back).

4.1.7 Student Flow Monitoring

Procedures governing student flow through the training pipeline shall be written in the Instructional Management plan. Policy on accelerated training, extension of training, attrition, and academic boards shall be as follows:

4.1.7.1 Student Data. Background data on every student entering a Navy course will be collected. As a minimum, data should include student name, age, Social Security number, highest educational level attained, ASVAB scores and test version, and a list of technical schools previously completed. This information may be used to assess individual students, identify students for possible advanced placement, and assist instructional personnel in solving individual learning problems. The date the student graduates or the date the student is dropped from training, with the reason for being dropped, will be entered on the reverse side of the Student Performance Record (Figure IV-3).

4.1.7.2 Student Progress. The academic progress of each student should be tracked on the Student Performance Record. When test results lead to counseling or remediation, appropriate information will be entered in the remarks column. Comments will be entered by the classroom instructor or learning center instructor as necessary. The student performance record will be used to measure student gains, record successful completion of instruction, and help determine areas for revision in delivery or testing processes. The student performance records will be retained, filed by CIN and class number, for a minimum of two years following graduation or disenrollment.

NAME		SSN	CLASS	COURSE IDENTIFICATION NUMBER
STUDENT PERFORMANCE RECORD CNET-GEN 1540/6 (Rev. 6-81) S/N 0107LLNF80741				
FINAL COMPREHENSIVE EXAM. SCORE	CUMULATIVE AVERAGE	CLASS AVERAGE	CLASS STANDING	GRADUATION DATE

DATE	UNIT/MODULE/LESSON TOPIC NUMBER & TERMINAL OBJECTIVE SHORT TITLE	TEST RESULTS	DATE COUNSELED	COUNS'S INITIAL	DATE RETESTED	RETEST RESULTS	REMARKS

Figure IV-3.--Student Performance Record

4.1.7.3 Accelerated Training. Where possible, a student capable of completing a unit/module criterion-referenced test, indicating achievement of all the learning objectives, Shall be permitted to progress to the next unit. This acceleration will be allowed to continue from unit to unit as long as all criterion-referenced tests are completed successfully.

A student whose level of previous experience and training indicates proficiency upon entry greater than that normally expected of a graduate shall be permitted to accelerate through the entire course by successfully completing the course's criterion-referenced posttest, or a combination of all the unit/module criterion-referenced tests for the course. The enrollment record of the student shall indicate that he or she is a graduate of the course.

Students accelerated through courses that contain a significant number of skill-type learning objectives shall be required to successfully complete the performance criterion-referenced tests and the unit/module written criterion-referenced tests.

4.1.7.4 Extension of Training. In no case shall an automatic setback policy be allowed. Academic and nonacademic setbacks, except those situations noted below, shall be recommended by Academic Review Board action, procedures for which are outlined in Section 4.1.8 below. All board recommendations must be approved by the officer in charge of the school administering the course. Academic setbacks occur in a group-paced course when a student is set back to a different class in

the same course for failure to meet the minimum standards. Nonacademic setback for such reasons as hospitalization, emergency leave, etc., shall be granted at the discretion of the officer in charge of the school. Such administrative actions do not require board action. Nonacademic extensions of training may be granted in addition to academic setbacks which have been recommended by the Academic Review Board. All extensions of training must be reported under the proper student action code in the NITRAS.

4.1.7.5 Remedial Instruction. In self-paced courses, a student who fails to successfully complete a module test will be assigned remediation and retested in any area in which (s)he failed to meet criterion. Remediation may consist of reassignment of specified portions of the original instructional materials, assignment of additional instructional resources, or assignment to a learning center instructor. Remedial loops, i.e., assignment of remediation followed by retesting, are developed as an integral part of the total instructional package for modules of an individualized course. Thus, remediation in an individualized course is not to be considered as an extension of training and there is no requirement in a self-paced course for academic setbacks as defined for a group-paced course. If a student has not achieved the criterion upon completion of all available remedial loops for a particular objective or group of objectives, then the student shall be subject to action by the Academic Review Board.

Remedial Instruction is designed to alleviate deficiencies in the achievement of course objectives. In some instances, remediation may be designed to improve basic verbal and/or computational skills. Remediation is part of the course of instruction in all group-paced courses to aid students who need additional study to maintain class progress. Qualified instructors

should be used to manage remedial programs. Programmed instruction, audiovisual materials, or peer instruction may also be used for remediation.

When students in a self-paced course do not make adequate progress toward course completion within their predicted times, they should be provided with the Quiet Study, Night School, or Supervised Study facilities necessary to extend their normal training day. Progress through the course continues as during the normal training day, including remediation and new assignments.

Remedial instruction SHALL NOT be used for disciplinary purposes. Learning and punishment should never be associated. Where feasible, the facilities of a self-paced course should be made available to students outside normal training hours for additional study time. A learning center instructor shall be available to provide any necessary assistance.

4.1.7.6 Attrition. When a student demonstrates inability or unwillingness to achieve the learning objectives of the course, there may be sufficient grounds for elimination from training.

Students may also be dropped from training for nonacademic reasons, such as: disciplinary action; administrative action, including low-quality discharge or fraudulent enlistment; unsuitability; lack of necessary security clearance; physical disqualification; dependency discharge, etc.

Disenrollment and reassignment procedures, service record entries, and problems concerning obligated service shall be handled in accordance with current NMPC and CNET directives.

4.1.8 Academic Review Boards

Academic Review Boards shall be established within each training activity. The functional command will establish the qualification of Academic Review Board members. The Academic Review Board should be composed of a chairman and

three additional members. The chairman shall appoint one of the members of the board to serve as recorder. The recorder will be a nonvoting member on actions recommended by the board and may be the person responsible for submitting data to NITRAS. When a student appears for an Academic Review Board, all members of the board will be present.

The Academic Review Board is designed to make recommendations concerning the student's progress; it shall not be used for disciplinary purposes.

The duties of the Academic Review Board are to:

1. Recommend to the commanding officer or higher authority a course of action when a student is qualified to accelerate his or her training.

2. Recommend to the commanding officer or higher authority a course of action when a student has failed to achieve the learning objectives based on test performance. Recommendations shall be one of the following:

- continuation of training in present class with or without remediation;
- acceleration of training;
- extension of training by class setback;
- elimination from training and recommendation for disposition.

All Board recommendations must reflect the current NITRAS student action codes, and the proper code for all recommendations should be assigned by the Board.

3. Maintain adequate records. In cases of disenrollment, the records shall be retained for no less than two years. Each school must monitor student progress and entry level skills. If students are not qualified to enter the course,

the situation must be documented, and recommendations for a change in assignment policy must be sent to the appropriate functional command for submission to NMPC. Student entry, graduation, setbacks, and attrition will be recorded in NITRAS, and records will be kept in the school.

4.1.9 Role of the Curriculum and Instructional Standards (CIS) Office

The CIS offices must be thoroughly familiar with the contents of this manual. Within the guidelines set forth for the CIS offices by CNETINST 1540.6 and complementing instructions issued by subordinate commands, the CIS offices shall ensure that all new and revised courses are developed and managed in accordance with this manual. CIS offices should make every effort to aid and monitor the schools in interpreting and using prescribed Navy documents in the analysis, design, development, implementation, and control of curricula.

4.1.10 Functions and Responsibilities of Course Curriculum Model Manager (CCMM)

Where the same courses are taught at activities under the cognizance of more than one functional command or at more than one activity within a functional command, one activity is designated as the CCMM. Each CCMM will become an integral part of each course for which it has cognizance by initiating curriculum development, conducting curriculum reviews, conducting analysis of feedback, and maintaining course audit trail documentation.

The functions of the CCMM are:

1. Initial development of curricula (i.e., Project Plan, Job Task Inventory, Instructional Management Plan, Curriculum Outline, Instructor Guides, Student Support Materials, tests/test items, Skills Profiles, etc.).

2. Management and processing of new and revised curricula.

3. Management of the curriculum review process and construction of Level II Survey items. Annual Course Reviews completed by all activities will be forwarded to the CCMM for appropriate action.

4. Development and maintenance of the highest level of current knowledge practicable in the subject matter of each assigned course.

5. Participation and representation at workshops and conferences.

6. Budgeting for the production and distribution of curriculum outlines, instructor guides, and student support material, including slides, transparencies, guides, handouts, etc.

7. Initiation of NITRAS and CANTRAC change entries.

8. Coordination and approval of the implementation of modifications of a course due to site-unique staff or resource difficulties. Once a course is developed and approved, the curriculum and its associated training materials become the standard for conducting the course.

4.2 CONDUCT OF INSTRUCTION

Instruction shall be conducted in accordance with the Instructional Management Plan. When a change occurs (i.e., an increase in the number of students to be taught without corresponding increase in resources, a change in entry behavior levels of the students, new training requirements, etc.) that requires a revision of part or all of the course, a Project Plan shall be submitted to the functional command. All Type A or B changes must be entered into the appropriate sections of the Instructional Management Plan. It is important that no discrepancies exist between policy and reality.

4.2.1 Training Data.

Obtain training data to be used in improving the course by carefully evaluating all instructional performance and external feedback.

PHASE V

CONTROL

5.0 INTRODUCTION

The purpose of this phase is to define procedures for evaluating instructional material to determine how effectively it has met the training requirements specified. The assessment is accomplished by internal and external evaluation. Internal evaluation is a continuous process which assesses student performance and evaluates the effectiveness of instructional material and methods. External evaluation serves two purposes: (1) to determine whether the course graduates can perform, on the job, the tasks they were trained to perform; and (2) to determine if the tasks being trained are in fact the tasks required on the job.

Required Documentation: Student Evaluation of Course and Instructors, Annual Course Review, Level II Survey Questionnaire Items, and Report of External Evaluation Findings.

5.1 INTERNAL EVALUATION

The purpose of internal evaluation is to determine how effectively the instructional effort meets its goal. This is done by assessing student performance and evaluating the effectiveness of instructional materials, strategies, and course management. Internal evaluation is a continuous process that, if followed, will aid in improving the entire course from within. Problem identification occurs during the development process, as a result of feedback from students and instructors, and through annual course reviews.

5.1.1 Feedback from Students

All courses will have a means of acquiring feedback from students on instructional materials, instructors, and tests for each unit/module of the course. General opinion-type questions, either oral or written, are acceptable, but they should solicit responses which can be used to evaluate specific parts of the training. An example of a Student Evaluation Form is shown in Figure V-1. When questionnaires are used, care should be taken to separate the questions so that each response is identifiable and that enough space is available for comments. It should be stressed to students completing the questionnaires that their comments should be confined to the training they received. Comments should not dwell on messing, berthing, or other environmental factors outside the scope of the course. It may be wise to develop a separate questionnaire to collect this type of data at the conclusion of the course.

5.1.2 Feedback from Instructors

Instructors, learning center instructors, and supervisory personnel are an invaluable source of information concerning the technical accuracy and completeness of the instructional materials, the sequence of objectives, the difficulty of the subject matter, etc. As these personnel report to the school for duty, they should be interviewed to determine if they have noted training deficiencies in recent graduates. The nature and scope of these deficiencies should be identified. The extent of the interview is dependent upon the resources available to the training activity. The guidelines presented in Section 5.1.3.1 are to be taken as general guidelines, not absolute requirements. The data gathered can be meaningful if used in conjunction with the NAVEDTRACOM Training Appraisal System discussed in Section 5.2.

STUDENT EVALUATION OF COURSE AND INSTRUCTOR

UNIT/MODULE ______________________ DATE ______________

CLASS ______________________ INSTRUCTOR(s) ______________

UNIT/MODULE EVALUATION	YES	NO	N/A
1. Were the learning objectives fully explained at the beginning of the unit/module?			
2. Did the instruction, student guide and practice items (if applicable) adequately prepare you for examination on the learning objectives?			
3. Were the training aids/equipment adequate?			
4. Was there sufficient time for practice prior to the practical examination?			
5. Did the examination test all of the lesson topic objectives for the unit/module?			
6. Were the grading criteria fully explained at the beginning of the unit/module?			
7. Was the classroom instruction sufficient to enable you to perform the required practical application(s)?			
8. Was the unit/module material organized in a clear and logical manner?			
9. If there were any materials/subject matter difficult to learn in the unit/module, please list them and comment why. Continue on reverse if necessary.			

Remarks: Please comment on each NO rating. Be as specific as possible.

Figure V-1.--Student Evaluation of Course and Instructor (Page 1 of 3).

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INSTRUCTOR EVALUATION

1. Were the instructor(s) prepared for the lesson(s)?	YES	NO
2. Did the instructor(s) make the explanations clear?		
3. Did the instructor(s) invite questions?		
4. Did the instructor(s) answer questions adequately?		
5. Was the level of instruction such that it was understood by all students? (The instructor did not teach either "over the head" nor "beneath" the students.)		
6. Were the instructor(s) available to students outside of class?		
7. Were the isntructor(s) enthusiastic about the subject?		
8. Did the instructor(s) make the best use of the time available for classroom instruction? Practice?		
9. Did the instructor(s) utilize the chalkboard/training aids/equipment effectively?		

Remarks: Please comment on each NO rating. Be as specific as possible.

Figure V-1.--Student Evaluation of Course and Instructor (Page 2 of 3).

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FACILITY EVALUATION	YES	NO
1. Were the physical conditions of the classroom/laboratory satisfactory?		

Remarks: Please comment on each NO rating. Be as specific as possible.

In your opinion, how could this unit/module be improved? Please be specific.

Figure V-1.--Student Evaluation of Course and Instructor (Page 3 of 3).

Instructors are also in an excellent position to identify problems with the course and make recommendations for change. They should be encouraged to keep a log in which to note inadequacies or inconsistencies in the instructional materials and tests; requirements for new or improved training aids or laboratory equipment; and ways to improve student movement, equipment usage, course management, and student record keeping. Suggestions for change should be compiled by the course developer and, where feasible, implemented during a later course revision.

If variations in approved instructional materials, sequencing, or objectives/tests are required due to an unusual circumstance (i.e., equipment damage or shortage), careful records should be kept and the variations noted in the annual course review.

5.1.2.1 <u>Guidelines for Collecting Feedback Information from Instructors.</u> Collection of data from instructors reporting for duty should be the responsibility of a senior individual assigned to the course or the CIS office. If possible, this individual should be one who has been instrumental in the development/revision of the instructional materials. This person should be capable of collecting the data and carrying it through analysis and ultimate course revision, as necessary.

An interview form should be developed which is consistent with the Level II Survey items (Section 5.2.3.2). For each job task statement, the new instructor should be asked variations of the following about a graduate's performance: Does the graduate, (1) do the task with ease, (2) do the task with difficulty, or (3) not do the task. Other areas for data gathering may be the adequacy of the training preparing the student to perform a specific job and the amount of supervision required to perform the task. TAEG Report Number 92, "A Structured Interview Methodology for Collecting Training Feedback Information," provides general guidelines for conducting the interview and developing the interview instrument.

The interview questionnaire item, whether presented orally or in a questionnaire, should:

1. Use abbreviations cautiously since they may not be understood by all individuals. It is good practice to spell out a term when it first appears and follow it with the abbreviation in parenthesis. In later tasks, the abbreviation may stand alone.

2. Use short words and phrases in preference to long words or expressions. For example, "Write production and control reports" is preferred over "Accomplish necessary reports involved in the process of maintaining production and control procedures."

3. Begin the task statement with a present tense action verb with the subject "I" understood; for example, use "operate," "write," "clean," instead of "operates," "writes," "cleans."

4. Begin each task statement with an action verb which specifies behavior that a supervisor can observe. Do not use verbs which reflect unobservable behaviors such as "plan," "devise."

Example: "Plan troubleshooting electrical malfunction on aircraft armament system," should be restated in a form such as:

"Troubleshoot electrical malfunctions of aircraft armament systems . . . "

5. Use action verbs which reflect behaviors which the supervisor can observe in the on-the-job performance of a graduate.

Example: "Describe safety precautions involved when . . . " is not considered appropriate for evaluation questionnaire use. Where possible, such statements should be converted to forms such as:

"Use (Observe, Practice, Follow) proper safety precautions involved when . . . "

6. Make each task statement specific and capable of standing alone. Do not use an action subheading followed by a series of objects.

Example: "Operate the following equipment: (1) automatic capsule filler, (2) distilling apparatus, (3) force filters" should be restated separately in a form such as:

"(1) Operate automatic capsule filler, (2) operate distilling apparatus, and (3) operate force filters."

7. Use simple statements without qualifiers unless the qualifier is essential to the meaning of the statement. For example, "Operate power mower" is preferred to "Operate power mower to cut grass," since the qualifier is not necessary. However, "Schedule personnel for formal training" is preferred over "Schedule personnel."

8. Include all other significant tasks with comparable modifiers, if a modifier is needed for specificity. For example, in an automotive mechanic inventory, "Repair transmissions" would probably be specific enough. However, if the stement were changed to read "Repair automatic transmissions," then "Repair standard transmissions" should also be added to the list.

9. Avoid stating tasks that are obviously too specific or trivial. For example, "Operate fork lift" is sufficient. It is not usually necessary to list subordinate tasks such as: "Turn ignition key," "Shift gears," "Elevate fork."

10. Avoid listing tasks that are too general. For training evaluation purposes, task statements such as "Repair carburetors," "Repair body sections," are preferred over more global statements, such as "Repair motor vehicles."

11. Avoid redundant and unnecessary qualifying phrases such as "when appropriate," "as required," "in accordance with prescribed directives." For example, "Maintain logs" is probably sufficient.

12. Present one job task at a time. Multiple tasks may occur from stating more than one verb requiring dissimilar actions such as "Remove and repair" or more than one object. Both are to be avoided since the instructor's opinion of training adequacy or appropriateness may not be the same for all tasks. Separate, discrete statements are preferred as shown in the two examples below.

Example 1: "Use proper safety precautions involved when working on both energized and deenergized circuits and in the use of general cleaning agents" should be divided into statements such as:

. "Use proper safety precautions while working on energized circuits."

. "Use proper safety precautions while working on deenergized circuits."

. "Use proper safety precautions while using general cleaning agents."

Example 2: "Manually load, arm, de-arm, and download inert airborne bombs" should be divided into statements such as:

. "Manually load inert airborne bombs."

. "Manually arm inert airborne bombs."

. "Manually de-arm inert airborne bombs."

. "Manually download inert airborne bombs."

13. Group more than one job task only when the tasks are usually done simultaneously or as a part of one general evolution.

Example: "Measure AC and DC voltage, small DC current and resistance with a multimeter AN PSM-4 or an equivalent."

14. Include the equipment needed to perform a task if there are other types of equipment with which to do the task.

Example: "Measure resistance of insulation with a 500-volt Megger."

15. Avoid referencing publications by number.

Example: "Describe equipment tag-out procedures in accordance with OPNAVINST 3120.32" can be restated in a form such as:

"Tag-out equipment."

16. Generate job task statements which can be expressed clearly and concisely in behavioral terms.

5.1.3 Course Review

A course review shall be conducted, normally on an annual basis, for all courses. The review of submarine training system courses will be conducted in accordance with NAVSEA OD 45519. The policy for scheduling course reviews shall be set by the functional commanders. Such factors as the newness of a course, time since the last review, course evaluation projects underway, planned changes in instructional system elements, task analysis status, existing staff workload, and so on, should be considered. Specific consideration should be given to scheduling the review to coincide with the Report of External Evaluation Findings generated as a part of the NAVEDTRACOM Training Appraisal Program (Section 5.2.1).

5.1.3.1 Course Review Checklist. Conducting a course review requires that the evaluator (either an instructor or a CISO representative) review five elements of the course. The elements are: Course Control Documents, Testing, Instructional Staff, Instructional Materials, and Course Plans and Data. To facilitate the evaluation process, a Course Review Checklist (Figure V-2) has been developed.

COURSE REVIEW CHECKLIST
CNET-GEN 1540/8 (Rev. 6-81) S/N 0107-LF-015-3761 — CNET Report 1540-2 (Feeder)

INSTRUCTIONS: Review the checklist and determine the training adequacy for each review element. Assign one rating code per item as applicable. Include comments concerning any additional areas reviewed in the 'Remarks' section. Asterisked (*) blocks are essential areas and must not be rated NA.

RATING CODES: A – Adequate (requirements being met) GA – Generally adequate (minor attention needed) I – Inadequate (major attention needed)

COURSE TITLE	CIN	SCM REVIEW DATE

PART 1. COURSE CONTROL DOCUMENTS		RATING				
	REVIEW ELEMENTS	A	GA	I	YES	NO
PROJECT PLAN	* On file (current and accurate)					
	* Approved					
JTI	* On file (current and accurate)					
	* Approved					
CURRICULUM OUTLINE	* On file (current and accurate)					
	* Approved					
	* Front matter					
	* Learning objectives clear and contain behavior, conditions, standards					
	* Reference list					
	* Training equipment list					
	* Training materials list					
	* Skills profile					
	* Master course schedule					
INSTRUCTIONAL MANAGEMENT PLAN	* On file (current and accurate)					
	* Approved					
	* Student Flow Management Plan					
	* Instructor Qualification Plan					

REMARKS (Explain each Inadequate and/or No and indicate corrective action in progress or recommend appropriate action. Continue on reverse, if necessary)

Page 1

Figure V-2.--Course Review Checklist (Part 1 of 6).

CNET-GEN 1540/8 (Rev. 6-81) S/N 0107LLNP03761
(Continued)

PART 2. TESTING

REVIEW ELEMENT	RATING				
	A	GA	I	YES	NO
* Is criterion testing being conducted?					
* Is there at least one test item for each objective?					
Do alternate test series/items for the same objective have an equal degree of difficulty?					
* Are item-by-item test statistics kept to identify areas where instruction is weak or test item is flawed?					
* Are test results used to provide feedback to students?					
Procedures for test critiques					
Time allotted for testing					
Procedures to prevent test compromise					
* Procedures for updating and revising tests in accordance with changes in learning objectives					
Students having difficulty achieving the learning objectives are identified early and are provided necessary remedial assistance.					
* Do test records include the number of the terminal or enabling objective to which the test item is related?					
* Are individual test results for each graduate retained for comparison with external appraisal findings?					

REMARKS (Explain each Inadequate and/or No rating and indicate corrective action in progress or recommend appropriate action. Continue on reverse, if necessary)

Page 2

Figure V-2.--Course Review Checklist (Part 2 of 6).

CNET-GEN 1540/5 (Rev. 6-81) (Continued)
S/N 0107LLNF03701

PART 3. INSTRUCTIONAL STAFF

	REVIEW ELEMENTS	RATING				
		A	GA	I	YES	NO
INSTR/LEARNING CTR INSTRUCTOR	Do instructional methods and techniques correspond to the selected instructional strategy for the course?					
	Have all instructors successfully completed the appropriate prerequisite instructor or LCI training?					
	Present in sufficient numbers to prevent accidents during potentially hazardous or dangerous situations?					
	Available in sufficient numbers for student access and assistance.					
SUPERVISORY PERSONNEL	Provide cross-training to produce multiple-assignment capability.					
	Instructor Evaluation Program					
	Instructor achievement recognition program					

REMARKS (Explain each Inadequate and/or No rating and indicate corrective action in progress or recommend appropriate action. Continue on reverse, if necessary)

Page 3

Figure V-2.--Course Review Checklist (Part 3 of 6).

CNET-GEN 1540/5 (Rev. 6-81) (Continued) S/N 0107-LL-F03761

PART 4. INSTRUCTIONAL MATERIALS

	REVIEW ELEMENTS	RATING				
		A	GA	I	YES	NO
INSTRUCTIONAL MODULES (Self-paced)	Learning objectives are explained to students in non-technical terms.					
	Student materials contain statement of material to be learned for each objective examples for performance objectives, practice items (consistent with test items) for each objective.					
	Lesson Topic Summaries					
	Lesson Topic Narratives with exercises					
	Lesson Topic Progress checks.					
	Audiovisual material					
	Enrichment material					
LRNG CTR INSTR GUIDE (Self-paced)	Front matter					
	Learning Center Instructor remediation guides					
INSTR. GUIDE (Group-paced)	Front matter					
	Lesson Topic Guides					
STUDENT GUIDE	Front Matter					
	Learning objectives are explained to students in non-technical terms.					
	Student material contains statement of material to be learned for each objective, examples for performance objectives, practice items (consistent with test items) for each objective.					
	Information sheets, Assignment sheets, note-taking sheets, and job sheets (as appropriate)					
	Enrichment material					
TRAINING AIDS/DEV	Classroom/learning center					
	Laboratory/shop					
FACILITIES	Classroom/learning center					
	Laboratory/Shop					

REMARKS (Explain each inadequate rating and indicate the corrective action already in progress or recommend appropriate action. Continue on reverse, if necessary.)

Page 4

Figure V-2.--Course Review Checklist (Part 4 of 6).

CNET-GEN 1540/6 (Rev. 6-81) (Continued)
S/N 0107LLNF00761

PART 5. COURSE PLANS AND DATA

REVIEW ELEMENTS	RATING	
	YES	NO
Instructional support materials are adequately stockpiled and supplied.		
Student input quotas are compatible with course instructional capability.		
Entry students meet established course prerequisites.		
Monitoring of course is conducted to identify developing problems and deficiencies.		
External evaluation data is utilized for course improvement.		
Records maintained for command inspections.		

REMARKS (Explain each inadequate rating and indicate the corrective action already in progress or recommend appropriate action. Continue on reverse, if necessary.)

Page 5

Figure V-2.--Course Review Checklist (Part 5 of 6).

CNET-GEN 1540/8 (Rev. 6-81) (Continued)
S/N 0107LLNF03701

COURSE TITLE	CIN	REVIEW DATE

PART 6. SUMMARY

COURSE CONTROL DOCUMENT	DATE OF DOCUMENT	ON FILE		APPROV'D	
		YES	NO	YES	NO
Project Plan					
Job Task Inventory					
Curriculum Outline					
Instructional Management Plan					

REMARKS (Explain each inadequate rating and indicate the corrective action already in progress or recommend appropriate action. Continue on reverse, if necessary.)

SIGNATURE OF REVIEWER	SIGNATURE OF COMMANDING OFFICER
TYPED NAME AND TITLE	TYPED NAME AND TITLE

Page 6

Figure V-2.--Course Review Checklist (Part 6 of 6).

The checklist is marked as follows: Adequate (A), indicating requirements are being met; Generally Adequate (GA), indicating minor attention/improvement needed; Inadequate (I), indicating major attention/improvement required; and Yes or No. Each "Inadequate" and/or "No" rating must be explained and the corrective action already in progress or recommended specified. It is acknowledged that some actions, for example, document approval, may be awaiting action by a higher authority. In such instances, the date the document was submitted and to whom will be listed. It should be noted that factors considered essential to the review, marked with an asterisk (*), cannot be rated NA. To aid the evaluator, inappropriate responses have been shaded.

Since the course review is essentially a self-audit, a quality course review will result if these checklists are completed by reviewers who have extensive knowledge of the course and its learning objectives, wide teaching experience in the course as well as recent fleet experience, and have been involved in the course design/development. It must be emphasized that the purpose of this course review is the improvement of the course. This review should not be interpreted as an effort to grade schoolhouse personnel or place blame.

. COURSE CONTROL DOCUMENTS. The documents listed in this section, along with the process evaluation checklists, constitute the minimal audit trail documentation. Each of the documents is a product of the course development process and must be approved by the curriculum control authority. The content and, for some, the format for these documents are specified in this manual, and should be reviewed by the evaluator before beginning the course review.

. TESTING. Tests/test items shall be reviewed to ensure that they are consistent with the objectives to which they are linked. Item analysis data, discussed in Section 3.7, should be used to identify inadequate test items.

If criterion-referenced testing is not being conducted for one objective, or if one test item is inconsistent with its objective, a negative response to the question is required, and corrective actions must be specified.

. INSTRUCTIONAL STAFF. When evaluating the instructional staff, it is important to remember that the effectiveness of a single instructor is not at issue, but rather the total course staff. In this light, individual instructor evaluations are reviewed to determine general problems. Manning documents are reviewed to ensure proper staffing. Instructor qualifications are researched to ensure that each instructor has received the necessary prerequisite training. The instructor evaluation program and instructor achievement recognition program directives and/or instructions will be reviewed and the degree of compliance noted.

. INSTRUCTIONAL MATERIALS. All instructional materials will be reviewed, including audiovisual and laboratory materials. Materials should be consistent with the learning objectives they support and provide examples and practice. The format of instructional materials will be examined for compliance with this manual. Materials developed prior to this manual, and which have not undergone revision, are exempt from format requirements. (Note in Remarks section.) However, NO material is exempt from the requirement to be consistent with the course objective(s).

A random selection of instructor guides should be reviewed to ascertain the amount of personalization required. Instructor guides which have excessive personalization by most of the staff should be considered for revision.

. COURSE PLANS AND DATA. This section addresses logistics and course management. A review of the course Instructional Management Plan will aid the evaluator throughout this section. Additionally, the results of the most recent Level II Survey, and the training responses of the training activities, should be examined to ensure

that corrective actions have been taken or the status of planned actions is known. The reviewer should verify that the course audit trail documentation, test records, and student and instructor critiques are available and organized in a logical manner.

Student entry characteristics and selection criteria should be monitored by the activity. Such factors as average course length, average test scores, and average number of remediations may be examined for significance. If a shift in the quality of students is found to be occurring, it should be noted, along with the impact on the course. Any corrective actions which will be required to compensate for the shift will be listed.

. SUMMARY SHEET. Any "Inadequate" or "No" ratings identified in the previous sections will be summarized in the Remarks. Once completed, this Summary Sheet will be forwarded, via the chain of command, to the functional commander. A copy of the Course Review becomes a part of the course audit trail documentation for a minimum of three years and should be available during command inspections.

5.2 EXTERNAL EVALUATION

There are two purposes for external evaluation: (1) to determine whether course graduates can perform, at the time of job entry, the tasks they were trained to perform at the planned level of proficiency and (2) to determine whether the tasks or knowledge taught are, in fact, the tasks and knowledge required on the job and assigned as objectives to the NAVEDTRACOM.

5.2.1 The NAVEDTRACOM Training Appraisal and Feedback System

The system for external appraisal in the Training Command is a centrally managed system which is divided into three levels. The system is discussed in detail in the CNETINST 1540.3.

5.2.1.1 Level I System. The Level I System provides a method to collect and respond to unsolicited feedback from outside the training command, and feedback from reports and systems which primarily serve other purposes. OPNAVINST 1540.50 provides instructions to the fleet on how to submit Level I feedback to the Training Command. In addition to unsolicited reports, important feedback information may be provided by:

- 3M system
- Propulsion Engineering Board inspection data
- CASREPS
- INSURV reports
- Operational Readiness Inspection reports
- NAVMAT Technical audits
- NAVSEA DART reports
- Reports generated by Mobile Training Units
- IMA findings

5.2.1.2 Level II Surveys. Feedback is provided for Level II Surveys by a systematic survey of immediate supervisors of a random sample of recent graduates. This system is managed by CNET. NAVEDTRACOM subordinate activities will not send questionnaires or multiple address inquiries outside the Training Command without specific instructions from CNET.

5.2.1.3 Level III Analyses. Training deficiencies which cannot be adequately understood using Level I or Level II feedback and internal evaluation data will be analyzed using Level III Analyses. The method employed may use a variety of techniques such as structured interviews, specialized questionnaires, and job performance testing. Level III analyses will be undertaken only by or at the direction of CNET. Procedures for requesting a Level III analysis are outlined in CNETINST 1540.3.

5.2.2 Use of Level I Sources

Schools and training activities are encouraged to make maximum use of Level I sources, especially contacts with associates in the fleet,

information from experienced personnel returning from the fleet, and information which can be extracted from reports of inspections or technical assistance visits. Since Level I reports may not be broadly based, or systematically described, they must ' ised with certain caution. However, Level I reports are important in pointing out potential problem areas which should be investigated by Level II surveys.

5.2.3 The Level II Survey System

5.2.3.1 Scheduling and Sample Selection. Scheduling of Level II surveys will be coordinated between CNET and functional commanders and announced by CNET Notice. Scheduling will be based on reports of potential problems from the fleet, indications of potential problems from NAVEDTRACOM activities, and results of earlier surveys. A survey of a course may be scheduled at any time to meet high priorty requirements. Training activities desiring additional feedback or more specific feedback should send a request for a survey or an additional elaboration survey to CNET via the functional commander.

The sample of graduates to be surveyed will be determined by CNET. The questionnaires will be mailed directly to the commanding officer of the activity to which the graduate has been assigned for completion by the immediate supervisor.

5.2.3.2 Feedback Questionnaires. The following factors should be considered in the development of a feedback questionnaire:

- QUESTIONNAIRE ITEM DEVELOPMENT. Questionnaire items will be developed directly from the curriculum outline by the training activity with the approval of the responsible functional commander. The related questionnaire statement will describe what the graduate is supposed to know or be able to do upon entry to a job in the fleet. It is the responsibility of the training activity to ensure that each questionnaire statement is precise and comprehensive.

. SIXTY ITEM LIMIT. Level II questionnaires will not contain more than 60 line items. Subject to the 60 item limit, all terminal objectives in the curriculum outline will be included on the questionnaire. Also, subject to the 60 item limit, major enabling objectives from the curriculum outline should be included. If additional space is available, elements of terminal or enabling objectives may be included on the questionnaire. Personnel preparing questionnaire items are encouraged to use as many items as are required to produce the specificity desired.

If space is a constraint, objectives will be grouped to a higher level of generality. It is not appropriate to select between objectives based on importance, leaving certain objectives out.

. QUESTIONNAIRE ITEM CONSTRUCTION. Ideally, items will begin with a verb and state a task which the graduate should be able to perform upon job entry. The questionnaire format and response choices are similar to the example in Figure V-3. Useful suggestions on questionnaire statements are in TAEG Technical Note 4-79 and in Section 5.1.3.1 of this manual. When an important objective or element is an item of knowledge, the questionnaire item may call for the display of knowledge or understanding which can normally be inferred from observation of performance of assigned duties. Subject to space limitations, items should avoid complex requirements such as operate AND maintain a piece of equipment, or "Locate signal converters, static switches, and power supplies."

Items should include established standards and performance rates such as ability to type 30 words per minute when the standard is part of the objective approved by the OPNAV sponsor or the fleet CINC. When a terminal objective has been approved by CNO, the questionnaire statement should follow the objective with fidelity, subject to guidelines on good questionnaire form.

TRAINING APPRAISAL
SUPERVISOR QUESTIONNAIRE
CNET Form 1540/7 (Rev. 3-80)

OPNAV Report (1540)

NOTE: All questionnaires must be accounted for.

APPLY NAME ADDRESS LABEL HERE	COURSE	FOR CNET USE ONLY
	CIN/COP/SPECIAL PIPELINE	☐ ☐ ☐ ☐ ☐ ☐

▶ **IMPORTANT:** If graduate named above did not report to your command, place an X in this box ☐ and return questionnaire with no further action.

CURRENT STATUS/ASSIGNMENT OF GRADUATE *(Mark the one best response)*

NOT ASSIGNED TO RATING FOR WHICH TRAINED *(If this section is completed, return questionnaire with no further action)*

- ☐ AT FURTHER SCHOOLING *(Including FRAMP)*
- ☐ IN ADMIN/HOLDING COMPANY
- ☐ DISCHARGED, CONFINED, UA, OTHER
- ☐ WORKING IN ANOTHER RATING
- ☐ MESS COOKING, LINE CREW, COMPARTMENT CLEANER

ASSIGNED

☐ ☐ Number of weeks graduate has worked in rating for which trained since graduation *(Preceed with zero if less than 10)*

SUPERVISOR COMPLETING SURVEY

☐ ☐ PAY GRADE *(e.g. E-6, W-1, O-2)*

☐ ☐ ☐ RATING *(Start with left box)*

DATE COMPLETED *(Use numbers)*

MO ☐ ☐ YR ☐ ☐

SKILL OR KNOWLEDGE ITEM	ADEQUACY OF SCHOOL TRAINING *(Circle one number in column 0 through 5 of this section)*						IMPORTANCE OF SCHOOL TRAINING *(Circle one letter in column a through e of this section)*				
	NOT OBSERVED	UNSATISFACTORY	LESS THAN ADEQUATE	ADEQUATE	MORE THAN ADEQUATE	MUCH MORE THAN ADEQUATE	TOO ADVANCED FOR GRADUATES OF THIS COURSE	NOT REQUIRED *(O/T can satisfy need)*	DESIRABLE BUT NOT ESSENTIAL	IMPORTANT AND MANDATORY	ONE OF THE MOST CRITICAL OBJECTIVES
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e
	0	1	2	3	4	5	a	b	c	d	e

Figure V-3.--Training Appraisal Supervisor Questionnaire.

If the objective is to operate a specific make or model of equipment, it should be included in the questionnaire item. If, on the other hand, the graduate is supposed to operate a generic type of equipment and a particular make or model of equipment was used in the school for training, the questionnaire item should include the generic name.

When submitted to CNET, each questionnaire item will carry two identifying numbers. The first will be the simple cardinal number which shows the chronological sequence of items, i.e., 1, 2, 3, etc. Following at least two spaces after this number, and in parentheses, will be the number of the terminal or enabling ojective to which the questionnaire item is related, i.e., "15. (7.2.2)." If necesssary for effective evaluation, more than one objective number may be listed, each in a separate pair of parentheses, in order of importance. If proposed questionnaire items are not of equal importance based on the investment of effort and resources by the NAVEDTRACOM, training activities may assign weightings to questionnaire items. If weightings are assigned by training activities, they will be used by CNET 015 when the percent of satisfactory items in a course are computed. Weightings may be shown by the approximate percent or decimal fraction of the course devoted to each item. Other indications of weighting may be used. Additional information on weighting will be provided separately.

5.2.3.3 Report of External Evaluation Findings (REEF). CNET will compile a list and forward it for review and comment to the commanding officer of the training activity designated as course curriculum model manager for. A copy of the report will also be sent to all training activities where the course is taught and to the functional commander who will interpret the findings in terms of resource support, future planning, managerial considerations, and other issues under his cognizance. The functional commander will provide additional instructions to the CO of the training activity as required.

The REEF will be annotated to show the questionnaire items with excessive below adequate responses, items with excessive instances of not being observed, and items which are reported to be too advanced or not required. The total questionnaire summary showing strong points as well as potential over training will be included. The report will include the open ended comments from the questionnaires. When applicable, the REEF will include the results of analysis which indicate a significant relationship between the apparent adequacy of training and such factors as the type of ship or activity to which the graduate was assigned. If requested by the training activity, CNET can provide comparisons of training adequacy with school location, rate or rating of the supervisor, times since graduation, or entry into the job for which trained, and ASFAM scores. List of activities responding, list of graduates, and sorts involving any of the above combinations can be provided. The REEF will also include Course Report which summarizes in a matrix how all the questionnaire items were rated. The matrix interrelates the adequacy of the training and the importance of the objectives. It shows a comparison with all other courses analyzed to date and gives an overall rating of the course.

5.2.3.4 <u>Evaluation of Findings on Adequacy of Training.</u> External evaluation data are, for the most part, at the level of generality of a job task or the related terminal objective. It is necessary to add specificity to external findings by linking them to internal data. As a minimum, action addresses of a REEF will review test data, instructional material for consistency and adequacy, and instructor/student critiques.

- REPORT OF ACTIONS TAKEN OR PLANNED (RATOP). Upon receipt and analysis of the REEF, action addresses must submit a report via the functional commander to reach CNET (Code 015) within 30 working days. The report will outline the interpretation of the findings of REEF, describe actions taken, detail actions initiated but not completed in response to the REEF, or recommend actions requiring concurrence by higher authority. The RATOP may also be used to request

another Level II survey or for a more detailed Level III survey. The RATOP must list and respond to every questionnaire item included in the REEF as a CNET interest item. If the action is not completed, estimated dates for milestones and ultimate completion must be included. Additional interest items may be designed by functional commanders.

Comparison of the REEF with course documentation and data can be done in several ways, one of which is described below and illustrated in Figure V-4.

At the beginning of the comparison process, the validity of several items is assumed: (1) the learning objectives accurately state job-related skills, knowledges, or tasks; (2) test items are consistent with learning objectives; (3) students entering the course meet the selection criteria established by Naval Manpower and Personnel Command; (4) the Level II Survey Questionnaire items precisely reflect the learning objectives. The validity of these assumptions may be disproven as a result of the comparison process.

For each item on the REEF annotated with excessive responses "less than adequate" or "unsatisfactory," compare historical data for the test items for the objective(s) addressed by the questionnaire. The average score on the test item(s), the distribution of the scores, as well as any item analysis data, should be used to determine if there is any weakness in student performance. If a weakness is discovered, the test item(s), instructional materials, and objectives should be checked for consistency and adequacy. For example, determine if the instruction is directed at and supports the end-of-unit/module test items, and the content matches the performace required. Determine whether an objective which is primarily a skill has adequate practical exercises which support mastery of the objective. Determine if prerequisite skills have been included and if an adequate mechanism is provided for integration and synthesis of related elements. Determine if the curriculum material consistently moves from less

complex to more complex skills and understandings. Of course, any corrective action(s) should be included in the RATOP.

It is equally important that, while analyzing these materials, staff or environmental problems of a significant nature are not overlooked by the training activity. These are instances when a shortage of instructors, equipment deficiencies or similar occurrences might have impacted upon the training during the period the survey sample was in the training pipeline.

If this process does not identify corrective actions, the five assumptions mentioned earlier should be reviewed as well as the need for a more specific Level II or Level III Survey.

Should the outcome of the first decision block (Figure V-4) be "no," the performance of the students in the sample judged "inadequate" must be evaluated. If a list of these students was not provided with the REEF, it, along with a list of *"adequate" performers,* should be requested from CNET. Upon reviewing the training performance of the "inadequate" sample, should it be found that they scored poorly, two areas must be examined. First, was the Student Flow Management section of the Instructional Management Plan followed and did the students meet the criteria specified in the course objectives? For example, does the student's performance record show excessive remediation? Did (s)he pass a unit/module as a result of Academic Review Board action? Are there other clues which indicate that the student(s) did not master the objective(s) in question? Second, did the student(s) meet the selection criteria for the course? Any variance from the Instructional Management Plan, or significant deviations from the course selection criteria should be noted in the RATOP.

ASSUMPTIONS:

1. The learning objectives accurately state a job-related skill, knowledge, or task.
2. Test items are consistent with learning objectives.
3. Students entering the course meet established selection criteria.
4. The Level II Survey items precisely reflect the learning objectives.
5. The survey sample is valid.

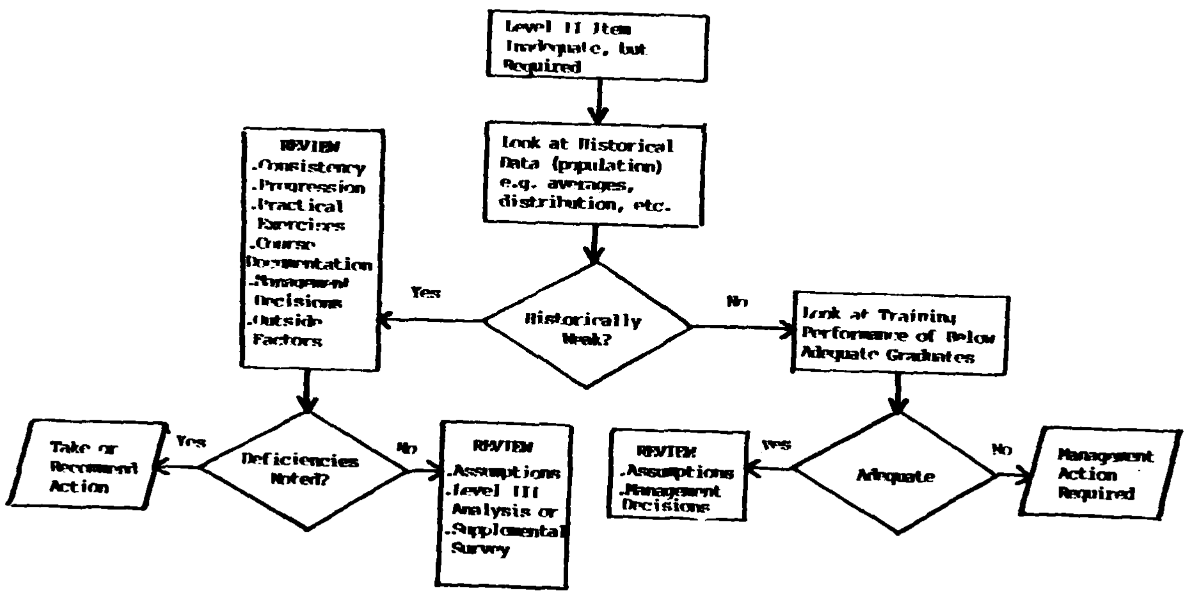

Figure V-4.—REEF Item Analysis Flowchart.

. STUDENT CRITIQUES. Compare external findings with student critiques of the unit, block, or module in which the unsatisfactory item appears, using data as prescribed in Section 5.1.2.

. EVALUATIONS OF INSTRUCTORS. Analyze Instructor Evaluation or Learning Center Instructor Evaluation records, as prescribed in Section 4.1.6.2. If Instructor Evaluations were not done on the module treating the objective in question, do them. Confirm that instructors are prepared and effective. Determine that instructors motivate and generate student interest, or, as a minimum, avoid demotivating the students.

. COURSE REVIEW. Conduct a course review as prescribed in Section 5.1.4. Emphasize evaluation of the problem items identified by external feedback.

. TRAINING CONFERENCE DATA. Review minutes/records of training conferences.

. FLEET CONTACTS. Make telephone inquiries to contacts in the fleet.

. MATERIAL REPORTS AND INSPECTION REPORTS. Seek explanation for problem areas in reports of inspections, maintenance team visits, equipment availability, and other sources listed for Level I feedback.

5.2.3.5 <u>Feedback from Personnel Returning from the Fleet.</u> Important sources of information for evaluating findings reported in the REEF are instructors and staff returning from the fleet who have been supervisors of recent graduates of the course in question. It is recommended that questionnaire items reported as inadequate in the fleet be used as an expanded checklist for collecting information from returning personnel. Additional guidelines on approaches to interviews of returning personnel are in Section 5.1.2.

5.2.3.6 Follow up. All items included in the REEF on which action is not completed will be tracked by CNET. The responsible activity or office taking the item for action must report completion to CNET (Code 015) so that the file can be closed when action has been taken. If a course is below the currently established "satisfactory" rating as shown on course report (see Section 5.2.3.3), the course will be resurveyed on a priority basis. If questionnaire items appear to be imprecise, stated with inadequate conditions, or ambiguous the questionnaire items must be revised immediately and a complete or item-by-item resurvey will be initiated. If a probable improvement (not including change of an approved objective) can be made based on best professional judgment, the change will be implemented as soon as possible and the estimated completion date will be reported. When a reasonable professional decision cannot be made without additional specificity, a supplemental survey should be requested on the less than adequate questionnaire items. The request should include detailed questions to be included on the supplemental survey. In general, it is not appropriate to schedule a major revision and take no further action unless the major revision will be completed within one year.

5.2.3.7 Reports to CINC's/TYCOM's/Sponsors. CNET will provide reports to sponsors, CINC's, and TYCOM's on action taken in response to feedback from the fleet.

5.3 REVISING SYSTEMS

If there is clear-cut evidence from the internal and/or external evaluation that the Job Task Inventory (JTI), instructional material, method of instruction, or the evaluation process itself needs to be revised, every effort must be made to find the problems and correct them. Generally, course revisions affect technique and performance levels but not content. The decision to revise or not to revise will be based on the input from the internal and external evaluation and the comparisons of these reports with the plans established by CNO.

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5.3.1 Identify Need For Revision

Changes to a course, other than Type C changes, shall not be made without the approval of the curriculum approval authority. Any corrective action must be according to procedures in this manual. The nature of the problem will determine where in the procedures to begin. A weak JTI would require entry in the analysis phase. Inadequate objectives would require entry in the design phase. The development phase would be the starting point for inconsistent instructional material.

5.3.2 Internal and External Evaluation Data

Data based system revision undertaken after careful consideration of the alternatives is the heart of the ISD process. The ability to make good decisions is dependent on the quality of the data collected and the care with which conclusions are drawn from the data. It is through the revision process, particularly the early phases, that some of the great payoffs from the ISD process can be realized.

5.3.2.1 Internal Evaluation Data. If effective, Internal Evaluation Data should localize the problems to specific learning objectives, thereby making the problem of revision much simpler.

TEST ITEM ANALYSIS. One means of pinpointing problems of learning objectives is to maintain test item analysis data for exam bank items and tests. The procedures for completing test item analysis and interpretation of results were discussed in the section on validation (3.7).

5.3.2.2 External Evaluation Data. Since external evaluation data deals principally with the relative success of the graduates as they perform on the job, it can be very useful in determining if and when course revisions are required. Such data, however, must be carefully analyzed and interpreted because discrepancies in performance may be due to such things as improper duty assignments, improper or inadequate supervision on the job, delay between formal training and actual on the job performance, or any number of other management/control problems; and no amount of revision to the course will eliminate these inequities.

5.3.3 Use of Internal and External Evaluation Data and Course Review Reports

The problems identified in the internal and external evaluation are many times serious enough to warrant a type A or B revision. If the benefit in improved student readiness and/or cost effectiveness of training to be derived from the revision exceeds the cost of the revision, a project plan shall be developed and submitted to the curriculum approval authority.

We would like to have your constructive criticisms and recommendations on the contents and presentation of material in this manual. This tear-out form letter is provided for your convenience. Typewrite, if possible; legible handwriting is acceptable.

Date______________________

From: ______________________________

____

______________________________ ZIP CODE __________

To: Chief of Naval Education and Training
Code N-524
Pensacola, Florida 32508

Subj: Procedures for Instructional Systems Development, NAVEDTRA 110

1. The following comments are hereby submitted:

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